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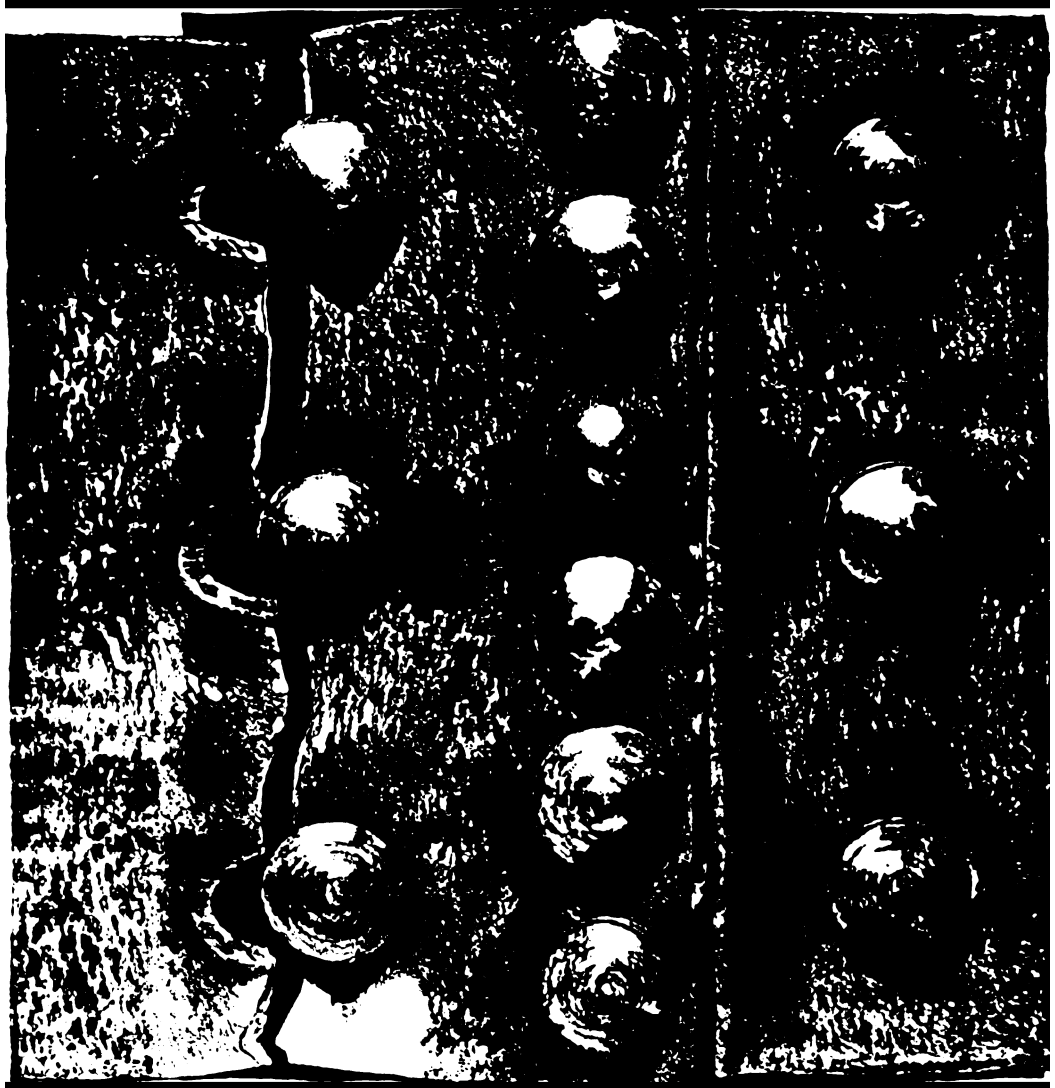

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EXECUTIVE DOCUMENTS

PRINTED BY ORDER OF THE

SENATE OF THE UNITED STATES

FOR THE

SECOND SESSION OF THE FORTY-SEVENTH CONGRESS,

For Sen. Ex. Doc. No. 5 (Report of National Board of Health, 1882) see Part 2, Vol. I.

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OF THE

SENATE OF THE UNITED STATES

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47TH CONGRESS, 2d Session. | SENATE. | EX. DOC. No. 1.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING

A report of the tests of iron and steel and other materials for industrial purposes, made with the United States testing machine during the fiscal year ended June 30, 1882.

DECEMBER 5, 1882.—Ordered to lie on the table and be printed.

WAR DEPARTMENT,
Washington City, December 4, 1882.

The Secretary of War has the honor to transmit to the United States Senate a letter from the Chief of Ordnance, United States Army, dated November 15, 1882, accompanied with the report of the commanding officer of Watertown Arsenal of the tests of iron and steel, and other materials for industrial purposes, made with the United States testing machine during the fiscal year ended June 30, 1882.

Attention is invited to the recommendations that section 3709 Revised Statutes of the United States be so modified as to exempt the procurement of material for tests from the operation of its requirements, and that authority be given by Congress for the frequent publications of the results of tests in order that information of such great value may be quickly disseminated; also to the recommendation that five hundred additional copies of the accompanying report be ordered printed for the use of the Ordnance Office; all of which recommendations are concurred in by this Department.

ROBERT T. LINCOLN,
Secretary of War.

The PRESIDENT *pro tempore*,
United States Senate.

ORDNANCE OFFICE, WAR DEPARTMENT,
Washington November 15, 1882.

SIR: I have the honor to submit herewith, for transmission to Congress, as required by law, the report of the commanding officer of Watertown Arsenal of the tests of iron and steel, and other materials for industrial purposes, made with the United States testing machine during the fiscal year ending June 30, 1882.

Attention is invited to the recommendation that the law (section 3709

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Revised Statutes) requiring the procurement of supplies by contract after advertisement be so modified as to enable this Department to procure materials for tests in open market. The reasons for this are briefly given in this report. Under this section purchases in open market can only be made when the public exigency requires the immediate delivery. The "public exigency" is therefore one of time only, and it has been so construed by the Attorney-General. I respectfully recommend that section 3709 be so modified as to exempt the procurement of material for tests from the operation of its requirements.

It is urgently recommended that Congress be asked to authorize frequent publications of the results of tests—monthly if possible—that information of such great value may be quickly disseminated. The present report of date August 31, 1882, will hardly issue from the Public Printer before next spring, at the very earliest—many months subsequent to the time when the results were obtained and ready for use.

I have also to recommend that Congress be asked to have printed five hundred additional copies of this report for the use of this office. The calls for it are many and constant, and this Bureau should be in condition to supply a limited number to those most interested.

Very respectfully, your obedient servant,

S. V. BENÉT,
Brig. Gen., Chief of Ordnance.

The Hon. SECRETARY OF WAR.

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REPORT

OF

TESTS OF METALS FOR INDUSTRIAL AND OTHER PURPOSES.

WATERTOWN ARSENAL, *August* 31, 1882.

SIR: I have the honor to report that during the fiscal year ended June 30, 1882, the testing machine at this arsenal has been kept busily at work in making tests for private parties and for industrial purposes agreeably to the provisions of the acts of Congress governing its use.

There have been tested during the year 1,587 specimens in all, of which number 855 were for private parties, and 664 were on Government account; the former occupied 97 days, and the latter 208 days. The private parties having work done were 33 in number, 2 of which were from Maine, 17 from Massachusetts, 3 from Rhode Island, 3 from New York, 2 from New Jersey, 4 from Pennsylvania, 1 from Michigan, and 1 from Kansas.

The specimens tested for private parties were by no means so large, the most of them, that they could not be tested on private machines of smaller capacity; many specimens were of quite moderate size, but the parties having tests to make seem to prefer to have the work done on the Government machine, having great confidence in the accuracy of its determinations and the care and faithfulness with which the work is performed.

Since the 9th of March, 1882, the date of your order directing that all money received for making private tests be covered into the Treasury instead of being used to pay the expenses of making such tests, as had formerly been done, there has been turned into the Treasury on this account the sum of $972.84. In addition to this the sum of $2,628.78 was turned into the Treasury from the appropriations of 1881 for making tests for industrial purposes, this being the amount of contracts entered into for materials which were not delivered according to agreement, within the stipulated time; and of the money appropriated for the last fiscal year the sum of $606.76 was covered into the Treasury on account of similar failures of parties to comply with the terms of their contracts. Thus of the moneys appropriated for making tests for industrial purposes $4,208.38 have not been used, but have been returned to the Treasury, mainly because of the want of promptness of contracting parties in furnishing materials for specimens to be tested agreeably to the terms of their contracts. This strict adherence to rules involving the rejection of material simply for the reason that it was not delivered at the time agreed upon, well enough in its way, causes great delays in executing work which is of great importance to the country; and for this and other reasons it is respectfully urged that the system of procuring materials to be tested may be modified so as to allow greater facilities for obtaining the exact kind of material wanted. This subject will be reverted to again before the close of this report.

The tests made during the last year have been mainly on riveted joints, and on the resistance of white and yellow pines to forces of compression in the direction of the fiber, or as used for columns, or posts. This resistance is given in various works on the subject, as it has

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been determined by different experimenters. The question to be determined was whether or not the information which we have on this point will serve as a safe and reliable rule for engineers to base their calculations on, in the construction of a bridge or building.

To solve this problem a large quantity of white and yellow pine was purchased in market; the conditions to be fulfilled were that the timber should be sound, free from sap, large and loose knots. It was procured in April, 1881, the white pine mostly from New Hampshire, with some from Michigan, and was stored for more than a year in a dry, well-ventilated store-house, after which it was tested as single and compound columns composed of two, three, and four sticks, bolted together with keys of different thickness interposed, sometimes with different thickness in the same column, giving it a swell at the middle; 191 tests of full-sized columns were made; the most of them were of the same length, 15 feet; the pieces were dressed, and the ends squared with care, so as to give an even bearing; they were first weighed, the rings of growth counted, the grain noted, whether straight or not, and placed in the machine in a horizontal position with the greater depth vertical, so that the weight of the column should have no effect in determining its deflection; the elastic limit, in compound columns, was first determined of the pieces separately, which were afterwards assembled, and the load increased gradually till failure took place.

When only a limited number of tests have been made with carefully selected sticks of small size, there is no trouble experienced in drawing definite conclusions therefrom; but as the tests increase in number and the size of the specimens becomes larger, the difficulty of drawing conclusions increases, and with a large number of tests of specimens of large size, and with the ordinary imperfections of the timber, it is almost impossible to draw any general conclusions applicable to all timbers. It was found that the average load for sticks as large as those used was about one-half of that which is ordinarily given as the ultimate load for these woods; that the weak points are the knots, and in pieces which yield by the crushing of the fibers failure always takes place at the knots; in pieces of greater length the effect of knots is less felt, and it cannot be clearly demonstrated to what extent they influence the resistance of the column; and in very long columns, unless the knots occur near the middle of the length, they seem to have no appreciable effect in determining the direction of flexure. Some sticks were tested a second time after the lapse of a year or more, and in all cases a diminution of strength was observed on the second trial.

A second series of tests was made on yellow pine, each increment of the load being permitted to remain for five minutes and then removed, measuring the set caused thereby. Curves have been plotted showing the effect of this continuance of the load, and the effect becomes more apparent as the ultimate strength of the timber is approached.

In compound columns care should be exercised in selecting the sticks which are to form the column; of course it would be useless to place a poor with a strong stick, but it is best to place the good together and the inferior by themselves. No attention was at first paid to this disposition until experience showed the advantage to be gained by its observance.

To make the effect of knots in the resistance of short posts to compression more apparent, some columns, after having been tested and their resistance determined, were cut up and specimens of shorter lengths taken and tested; the difference in the strength was very marked, as was to be expected. An oak column 168 inches long, which yielded at 4,953 pounds per square inch, showed in a specimen 32 inches long

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cut therefrom 8,450 pounds per square inch, and another 7,794 pounds per square inch, which then gave way at a knot. Another post, 164 inches long, failed at 3,432 pounds per square inch, but a piece 32 inches long was cut from it which gave 6,230 pounds per square inch. A yellow-pine post 143 inches long gave a resistance of 4,663 pounds per square inch, but a specimen 32 inches long was taken from it which had a resistance of 6,230 pounds per square inch. Pieces of smaller size could doubtless have been cut from each of these which would have shown still greater strength, as they might have been obtained more free from imperfections of all kinds. Knots of even small size, firm and sound, exercise an injurious effect upon the strength of timber. This was shown in a piece of spruce from which two samples were cut—one having a uniform, straight grain, the other two small knots; the strength of the former was 11 per cent. greater than the latter. A photograph gives some idea of the apparent insignificance of the knots in this case.

When we come to determine the resistance of specimens having knots to forces of compression at right angles to the fibers of the wood, we find the resistance much increased, and this increase should be taken into account when selections for this purpose are possible. The resistance of specimens of a given wood as compared with others of its kind is generally indicated by its specific gravity, but this does not always hold good. In yellow pines, some of those rich in turpentine have a high specific gravity and yet are not the strongest. The rapidity of growth will sometimes give indications of the strength. A rapid growth in oak is apt to be accompanied by an increase of strength, while the reverse is often true in yellow pine.

RIVETED JOINTS.

Testing-machines in general have not been arranged to hold conveniently and rigidly flat plates of considerable width, and consequently there are on record no great number of tests giving the proportions of resistance of such joints to the area of cross-section of metal. With the view of determining the much-needed data on this subject, both as applied to boilers, bridges, and similar structures, I instituted an extended series of experiments, commencing with the tests of ordinary specimens of the material used to determine its tensile strength and to serve as a standard of comparison for all of the succeeding tests. Afterward grooved specimens, 146 in number, were tested. At first the area of cross-section remained constant, the size of the groove varying from $\frac{1}{4}$ inch to $\frac{3}{4}$ inch, and then the area was increased. Of these preparatory tests 214 were made.

Experiments were instituted to determine the amount of friction that is caused by the pressure with which one plate is forced against its neighbor by the riveting. Iron and steel plates $\frac{1}{4}$ and $\frac{3}{8}$ inches were used, held together first with one rivet and afterwards with five rivets; and the shearing strength of the rivets determined. More than 100 tests have been made of single-riveted lap-joints of plates $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, and $\frac{3}{4}$ inch, both of iron and steel, and double-riveted lap-joints with $\frac{1}{4}$ and $\frac{3}{8}$ inch plates, and single-riveted lap-joints, with a reinforced welt, with plates of $\frac{3}{8}$ inch, both iron and steel.

A portion of a locomotive boiler which had been in service for twenty-four years was obtained from one of the railroad companies with the view of determining in what way it compared with boilers made at this time. So far as could be detected by examination it had undergone no marked change, but when subjected to stress it showed a grooving of about $\frac{1}{4}$ inch deep. A photograph of the specimen was taken to show

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the thickness to which the metal was reduced by this long-continued action.

MISCELLANEOUS TESTS.

Some iron bars which had been previously tested and showed a mean ultimate strength of 52,034 pounds per square inch, were tested again after an entire rest from eight to ten months. The mean ultimate strength after rest was 62,146 pounds per square inch. Such a bar was heated to a cherry-red heat and permitted to cool, when it was tested, and broke at 39,700 pounds per square inch, showing that the increase of strength gained by previous stress was lost by the reheating, and the iron had ceased to be as strong as it originally was.

Some 2-inch round bars of single and double refined iron which could not be tested last year for the want of proper means to hold the bars, have been tested, and show that the ultimate strength of the product of one mill was slightly less for the single refined than the double, and of the other the strength was greater.

Wrought iron I-beams have been tested to give their resistance when used as columns; and some short columns with one pin and one flat end, remnants of columns on hand, have been tested for compression.

With the means at my disposal I am able to give merely the results obtained by the testing machine. I have not the means of working up these results to show more clearly their bearing, and fit them for the practical use of others.

The provision made in the machine for holding flat bars of moderate size, or specimens of plate, are all that can be desired, but the conveniences for testing round bars of all sizes are not so perfect. The specimen, if it be of a ductile material, is diminished in size, and as the holder does not follow up the action of the specimen, the latter is not held so firmly as at first, and finally is liable to slip in the die. The importance of being able to test specimens of round bars of all sizes just as they come from the mills, was deemed so urgent that I proceeded at considerable expense to add to the machine this important and necessary part. It is made throughout of steel, and from the experience thus far had with it there seems to be little doubt of its answering the desired purpose admirably well. As yet I have prepared only a single set of dies for 2-inch bars; others will have to be added as the necessities require and the funds will permit. The cost of this new holder has been $1,309.

Mr. James E. Howard, who has had the immediate charge of the machine and of the tests made thereon, has performed his laborious duties in a manner highly acceptable to myself and the private parties who have had occasion to make use of the machine. His intelligent interest in the work, the care that he takes to insure entire accuracy of results, his quickness to observe all that takes place, and the skill with which he manages the machine, are a sure guarantee for the perfect reliability of the results obtained, and persons who have been present at the tests of their own materials, to see for themselves that every precaution is taken to insure accuracy, have expressed themselves as entirely satisfied in every particular with the manner of conducting the work.

I am indebted to Capt. John Pitman, Ordnance Department, for the chemical analysis of certain specimens of iron and steel, and for the photographs and drawings which serve to illustrate this report. The labor of preparing the latter has been performed by him cheerfully, though it has not been customary to require such work, week after week,

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from an officer of his rank; no alternative, however, was left me, for when I asked for authority to procure the services of a draughtsman and computer for this purpose, I was told to call upon my officers to perform those duties. From this it might be argued that a high estimate was not placed on the services of the officers of the Department. I cannot believe that the Government consults its best interests by such assignments of its officers to duty. Captain Pitman can, in my opinion, be better employed than as a draughtsman, accomplished as he is in this particular. I am indebted to Mr. Joseph M. Wilson, C. E., engineer of the bridges and buildings of the Pennsylvania Railroad, and W. S. Thompson, C. E., for suggestions in regard to the tests, the former of riveted joints for bridges, &c., and the latter of wooden columns or posts. I appreciate the interest that these engineers have taken in this work, and have profited by their suggestions.

In my last year's report I proposed to add to this machine the necessary fixtures to enable me to make tests of torsion, and measure the transverse resistance of materials on this machine. Further experience convinces me that in place of changing this machine to adapt it to these several kinds of work it would be better to make new machines for these purposes and retain the present for those tests for which it is so well adapted. The only objection that has come to my knowledge in relation to the tests made by the Government on this machine is the expense attending them. This has been urged only by those who have had very long specimens to test; and in order to do this work extensive changes had to be made in the machine to prepare it for the extraordinary demand made upon it. It requires a half day and the services of three additional men to remove the holders from their normal position so as to take in these long specimens; and when, as it often occurs, they have considerable ductility, the time required to follow up a stretch of 40 inches or more, as has been necessary in some cases, and to rupture the specimen, necessarily makes the expense proportionately great. If, as in other machines, only specimens of nearly one size were tested, this expense of shifting from kinds of work widely dissimilar would not be required; but just in proportion as the machine is made to do a greater variety of work, so will the cost of doing this work be increased from the necessity of making greater changes in the machine to adapt it thereto. In the selection by a certain party of a machine on which to do some extensive work of testing, outside considerations made it desirable that another machine than that of the Government should be chosen. Examination of both machines was made, with the view of determining which should be finally chosen; and the result of the investigation led to the selection of the Government machine, as the choice of any other would involve too great a sacrifice of time and convenience to render it admissible. The wisdom of the choice has been made apparent by both the quantity of work as well as its quality; as many as 80 tests having been made in one day, when the specimens varied only slightly and many measurements were not required.

It almost always happens that a combination machine is made such at the sacrifice of some one or more important feature, and to attempt to engraft on the testing machine now on hand, which will have work enough to keep it busy for years to come, the means of making transverse and torsional tests, will result in providing means of making transverse and torsional tests inadequate to the wants of the country, and will further complicate the machine so as to increase the labor of adapting it to these various kinds of work and thereby proportionally add to

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the cost. I would therefore respectfully recommend that, instead of changing this machine to adapt it to perform any new service, it be retained for the uses for which it is at present prepared, and that new machines be built for testing transversely and by torsion. We shall then have the most complete means of performing economically the several tests to which it is desirable to subject materials according to the use or purpose for which they are intended, and this course will in the end prove not only the most convenient but also the most economical and satisfactory.

There are one or two points in regard to which it is highly desirable that there should be some special legislation to render it possible to carry on this work to the best advantage. And first, in regard to the procurement of materials. The law requiring the contract for supplies furnished to be given to the lowest bidder renders it impossible at times to procure just the kind of materials which it is desirable to test. I have just been testing the white and yellow pines as they are found in our markets. Of these woods we know next to nothing, where they grew, when they were cut, of what varieties they are, what kind of soil furnished them, &c. It is highly important that we should make tests of timber in large pieces cut from trees, the complete history of which we can be perfectly sure of. This is not possible without some change in the law directing how purchases shall be made.

So, again, it is desirable that we should test specimens of iron and steel made from certain ores, the history of which and the product in all of its details we shall have full and complete knowledge of. How can we have this when we must purchase of the lowest bidder and take his word only that we shall have what we require?

Again, it is desirable that we shall have the means of printing the results of the tests without waiting some two years to have it done as at present; and we also much need the means of disseminating this information where it is most wanted and most highly appreciated. There is information in this report of great interest and value to certain industries which will be kept in ignorance of it for two years or more after the tests were made, when the parties could, by a different system of publication, not practicable without new legislation, have been in possession of the main facts almost immediately after the facts were determined.

Applications are constantly made to me for copies of the reports of the tests which have been already made. It would seem to be a very proper arrangement to place a given number of those reports at the disposal of the officer having charge of the making of the tests, to be disposed of on the payment of a fixed price, to enable those who have an interest in knowing about the tests to procure at a moderate expense the detailed report of them.

I would again recommend that specimens which have been tested may be sold, and the proceeds used in procuring other materials for similar purposes, a report, of course, of all such sales to be made to Congress. The money appropriated for the testing of materials for industrial purposes, so far as it has been spent, it is believed has been expended judiciously, economically, and for the purposes for which it was appropriated. The results obtained will be appreciated most by those who know most of the wants that are thereby filled, who are most conversant with the subject considered. A larger sum of money than has heretofore been granted by any annual appropriation can be expended to great advantage to the country at large in carrying on these tests. This is a matter in which all are more or less intimately con-

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cerned, as all are interested in the safety of our bridges, public buildings, locomotive and steamboat boilers, &c., which may be made by the aid of such information as can only be obtained from such tests as are here referred to, both safer and more reliable, and at the same time less expensive than at present.

Money is freely and wisely given for the dissemination of useful practical knowledge in regard to any of the various branches of agriculture, but the people are as much interested in the development of our immense mineral resources and the improvement of our manufactured productions as in those of the soil. Valuable information furnished in reference to the former will repay as surely and promptly the cost attending its determination and dissemination as the latter. An enlightened policy demands liberality in expenditures for each of these purposes, for the public need is as intimately connected with the sure, steady, and rapid development of the one as the other.

Very respectfully, your obedient servant,

T. T. S. LAIDLEY,
Colonel of Ordnance, Commanding.

The CHIEF OF ORDNANCE.

REMARKS ON RIVETED JOINTS.

This series of tests comprises the tensile tests of joints with plates having a nominal thickness of $\frac{1}{4}''$, $\frac{3}{8}''$, $\frac{5}{8}''$, and $\frac{3}{4}''$ of wrought iron and open hearth steel.

The tensile test of the material itself for each thickness of plate.

In $\frac{1}{4}''$ plates was determined the strength of grooved specimens, the resistance to shearing out at rivet holes, and shearing parallel to the grain of the metal. Experiments upon the friction of rivets are given. The wrought-iron plate was furnished by one maker out of one quality of stock.

The steel plates were supplied from one heat cast in ingots of the same size, the thin plates differing from the thicker plates only in the amount of reduction given the metal by the rolls.

All joints have machine-driven rivets unless otherwise stated in the detailed notes. "Burden's best" iron rivets used; steel rivets made of mild steel of about the same quality as employed for boiler plates.

The joint plates have planed edges; except where calked the metal was first planed and then chipped to a beveled edge. Elongations were measured within a gauged length of 10″ including and symmetrical with the center line of the joint. An exception to the above location of the gauged length is found with the $\frac{1}{4}''$ iron butt joints, where the 10″ gauged length began at a point on the center line of the welt and included only one row of rivets.

The recorded elongations show the slip of the joint plus the elongation of the plates.

The modulus of elasticity of the metal was found: Iron plate, 31,970,000 pounds; steel plate, 28,570,000 pounds.

The space between the testing-machine jaws was kept at 24″. Joints were adjusted in the jaws to compensate for the offset of the lap. As loads were applied observations were made to determine the amount of distortion indicated by the opening of the joint at the calked edge.

In the tabulated results the manner of fracture is shown by sketches of the joints, and is further indicated by underscored figures in columns headed: Maximum strains on joint, pounds per square inch.

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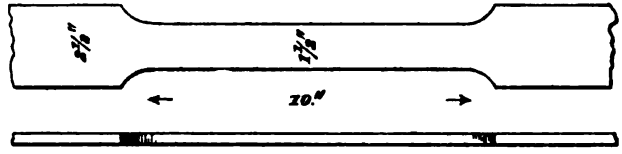
TENSILE TESTS OF WROUGHT-IRON PLATE.

Material used in riveted joint tests.



Number of test.	Nominal thickness.	Direction of grain.	Actual dimensions. Thickness.	Actual dimensions. Width.	Sectional area.	Elastic limit. Actual pounds.	Elastic limit. Pounds per square inch.	Ultimate strength. Actual pounds.	Ultimate strength. Pounds per square inch.	Elongation in 10 inches.	Uniform elongation.	Area at fracture.	Contraction of area.	Appearance of fracture.	Remarks.
	In.		*Inch.*	*Inches.*	*Sq. in.*					*Perct.*	*Perct.*	*Inches.* *Sq.in.*	*Perct*		
440	¼	Lengthwise	.257	1.515	.389	14,150	36,370	18,810	48,350	17.0	16	.21 x 1.43=.300	22.9	Fibrous lamellar.	Hammered cold before testing with 6-pound hammer, stretching metal ".10 in 10"=1.0 per cent. Rapid stretching began at 44,920 pounds per square inch.
441	¼	.. do	.238	1.514	.360	12,930	36,050	17,100	47,500	16.8	16	.20 x 1.43=.286	20.6	....do	
442	¼	....do	.260	1.516	.394	Not obtained.		20,280	51,470	8.4	7	.20 x 1.48=.296	24.9	....do	
443	¼	Crosswise	.265	1.500	.397	10,200	25,700	15,150	38,160	4.5	4	.25 x 1.46=.365	8.1	....do	
444	¼	do	.266	1.500	.399	9,900	24,810	15,100	37,840	4.0	3	.25 x 1.47=.367	8.1	....do	
77	⅜	Lengthwise	.375	1.494	.560	18,300	32,679	26,650	47,590	13.6	12	.32 x 1.42=.454	18.9	Fibrous, marked lamination.	Hammered cold before testing, stretching metal ".15 in 10".
78	⅜	....do	.377	1.495	.564	17,200	30,496	26,380	46,773	10.8	10	.34 x 1.43= 486	13.8	... do	
79	⅜	....do	.376	1.496	.562	20,800	37,010	27,250	48,488	5.0	2	.34 x 1.47=.500	11.0	... do	
255	½	Lengthwise	.515	1.500	.773	19,400	25,100	33,550	43,400	11.4	10	.44 x 1.41=.620	19.8	Fibrous	Hammered cold before testing, stretching metal ".19 in 10".
256	½	....do	.511	1.503	.768	19,800	25,789	35,200	45,830	13.8	13	.45 x 1.41=.635	17.3	....do	
257	½	....do	.501	1.502	.752	Not well defined		38,800	51,600	4.5	Irregular.	.44 x 1.49=.656	12.8	....do	
310	¾	Lengthwise	.621	1.496	.929	24,500	26,370	40,900	44,030	10.3	10	.55 x 1.44=.792	14.8	Fibrous dull	Hammered cold before testing, stretching metal ".15 in 10".
311	¾	....do	.621	1.505	.935	23,800	25,450	42,300	45,240	12.4	12	.55 x 1.43=.787	15.8	....do	
312	¾	....do	.627	1.497	.939	Not well defined		44,700	47,600	4.9	.....	.55 x 1.50= 825	12.1	.. do	
313	⅞	Lengthwise	.696	1.505	1.047	29,200	27,890	48,950	46,750	12.8	11	.61 x 1.42=.866	17.3	Fibrous dull	Hammered cold before testing, stretching metal ".15 in 10".
314	⅞	....do	.694	1.495	1.038	27,450	26,440	48,200	46,430	13.8	11	.61 x 1.39=.848	18.3	.. do	
315	⅞	....do	.696	1.492	1.038	Not well defined		53,250	51,300	7.0	.....	.59 x 1.49=.880	15.2	... do	

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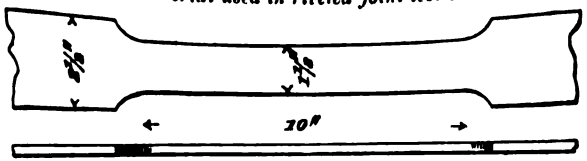
TENSILE TESTS OF O. H. STEEL PLATE.

Material used in riveted joint tests.



Number of test.	Nominal thickness.	Actual dimensions.		Sectional area.	Elastic limit.		Ultimate strength.		Elongation in 10 inches.	Uniform elongation.	Area at fracture.	Contraction of area.	Appearance of fracture.	Remarks.
		Thickness.	Width.		Actual pounds.	Pounds per square inch.	Actual pounds.	Pounds per square inch.						
	In.	*Inch.*	*Inches.*	*Sq. in.*					*Perct.*	*Perct.*	*Inches. Sq. in.*	*Perct.*		
397	¼	.247	1.515	.374	14,700	39,440	20,940	56,000	26.7	20	.13 x 1.24=.161	57	Silky	Hammered cold before testing, stretching metal ".15 in 10".
398	¼	.244	1.513	.369	15,600	42,280	20,490	55,530	24.2	20	.14 x 1.16=.162	56.1	...do	
399	¼	.250	1.51	.378	15,000	39,680	22,060	58,360	19.2	13	.11 x 1.28=.141	62.7	Fine silky	Hardened specimen heated cherry-red and plunged into cold water.
400	¼	.248	1.512	.375	17,800	47,170	27,900	74,400	13.4	8	.12 x 1.31=.157	58.1	...do	
72	⅜	.375	1.502	.563	19,500	34,636	29,300	52,042	28.6	24	.20 x 1.04=.208	63.1	Fine silky	Hammered cold before testing, stretching metal ".11 in 10".
73	⅜	.377	1.492	.562	18,200	32,384	29,400	52,313	27.8	21	.21 x 1.03=.216	61.5	...do	
74	⅜	.375	1.500	.563	17,800	31,616	30,250	53,730	26.6	18	.21 x 1.08=.227	59.7	...do	
75	⅜	.373	1.498	.559	17,800	31,810	30,200	54,025	27.1	21	.20 x 1.04=.208	62 8	...do	
76	⅜	.372	12.000	4.46	141,000	31,610	245,000	54,930	.....	17	.19 x 10.00=.191	57.2	Silky	
252	½	.500	1.490	.745	23,200	31,140	42,200	56,640	29.2	24	.30 x 1.06=.318	57.3	Silky	Hammered cold before testing, stretching metal ".16 in 10".
253	½	.501	1.499	.751	23,500	31,290	43,400	57,790	26.1	20	.33 x 1.09=.360	52.1	...do	
254	½	.496	1.500	.744	33,500	45,030	43,180	58,040	23.0	19	.29 x 1.15=.333	55.2	...do	
304	⅝	.621	1.504	.934	29,980	32,100	49,100	52,570	29.0	24	.35 x 1.00=.350	62.5	Silky	Hammered cold before testing, stretching metal ".15 in 10".
305	⅝	.621	1.495	.928	31,300	33,730	48,550	52,320	28.2	21	.35 x 1.00=.350	62.3	...do	
306	⅝	.621	1.500	.932	Not well defined.		49,600	53,220	27.1	18	.33 x 1.07=.353	62.1	...do	
307	¾	.731	1.500	1.097	33,850	30,860	56,400	51,410	29.5	22	.39 x .96=.374	65.9	Silky	Hammered cold before testing, stretching metal ".15 in 10".
308	¾	.734	1.502	1.102	33,550	30,440	56,950	51,680	28.7	22	.41 x .96=.394	64.3	...do	
309	¾	.730	1.500	1.095	Not well defined.		57,250	52,280	28.6	25	.37 x 1.04=.385	64 8	...do	

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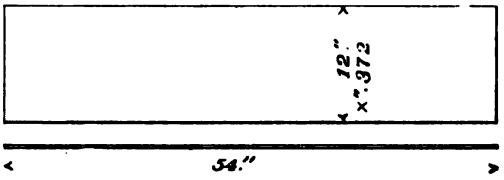
No. 76.

TENSILE TEST, $\frac{3}{8}$″ STEEL PLATE.



Sheet stamped T. S., 60,000 pounds.
Sectional area, 4.46 square inches.
Gauged length, 20″.
Free length of specimen between holders, 32″.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
4,460	1,000	0.		
22,300	5,000	.0025		
44,600	10,000	.0060		
	1,000		0.	
66,900	15,000	.0095		
89,200	20,000	.0130		
	1,000		0.	
111,500	25,000	.0165		
	1,000		0.	
118,000		.0178		
123,000		.0182		
125,000		.0188		
127,000		.0190		
129,000		.0191		
131,000		.0195		
133,800	30,000	.0200		
	1,000		0.	
135,000		.0202		
137,000		.0205		
139,000		.0208		
141,000	31,610	.0212		Elastic limit.
143,000		.0255		
145,000		.0480		
147,180	33,000	.0800		
151,640	34,000	.14		
156,100	35,000	.38		
178,400	40,000	.60		
200,700	45,000	.94		
223,000	50,000	1.58		
245,000	54,930			Ultimate strength.
0	0	3.70=		18.5 per cent.

Elongation of inch sections, ″.14, ″.14, ″.14, ″.14, ″.15, ″.15, ″.16, ″.16, ″.16, ″.16, ″.16, ″.16, ″.17, ″.17, ″.17, ″.17, ″.17, ″.17, ″.18, ″.19, ″.20, ″.21, ″.23, ″.25, ″.29, ″.34, ″.44, ″.57, ″.96, ✱ ″.38.

Minimum width at fracture, 10″.06.
Average thickness at fracture, ″.19.
Area at fracture, 1.91 square inches. Contraction of area, 57.2 %. Silky fracture. The specimen varied in thickness; the elastic limit was passed in the minimum section first. Fracture occurred at the smaller end, and the elongations show the greatest stretch at this end.

When the "Cooper lines" were first developed some appeared at right angles to the axis of the specimen; others followed in diagonal lines from each edge, intersecting each other.

The diagonal lines make an angle of 56° 20′ with the axis of the specimen.

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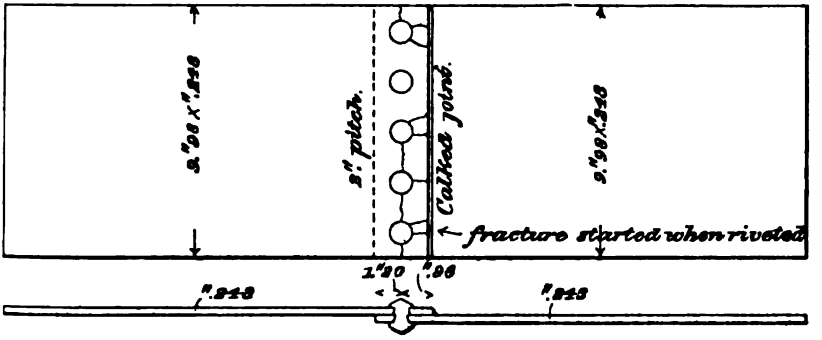
The direction of fracture was diagonally across plate at an angle of 67° 10′ with the axis of the specimen.

When the fractured ends are brought together an opening at the middle remains about ″.23 wide.

SINGLE-RIVETED LAP JOINTS, ¼″ IRON PLATE.

No. 35.—¼″ IRON PLATE. JOINT A.



⅝″ iron rivets, "Burden's best."

Punched holes: Punch, ″.695 diameter; die, ″.752 diameter.

	Square inches.
Gross sectional area of plate	2.425
Net sectional area of plate	1.55
Bearing surface of rivets	.88
Shearing area of rivets (″.70 diameter)	1.92

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
8,000	.0009		
10,000	.0012		
15,000	.0018		
20,000	.0040		
25,000	.0059		
30,000	.0080		
35,000	.0108		Joint opened about ″.01, or less.
5,000		.0030	Rivet heads scale.
40,000	.0145		
42,000	.0162		
44,000	.0188		
46,000	.0212		
48,000	.0240		
50,000	.0270		Joint opened barely ″.02.
52,000	.0298		
54,000	.0345		
56,000	.0480		
58,000	.0556		
60,000	.0635		
62,000	.0735		
67,000			Ultimate strength.

Failure occurred by tearing out upper plate at four rivets, as shown by the sketch, and by shearing one rivet, second from outside. The fracture first in sight appeared at the end of the plate at the calked side of the joint. Fractures also appeared at the end of the lap opposite the three middle rivets. In the under plate no fracture apparent at the holes. The sheared rivet had fracture started under the head. Another rivet was slightly fractured in the same manner.

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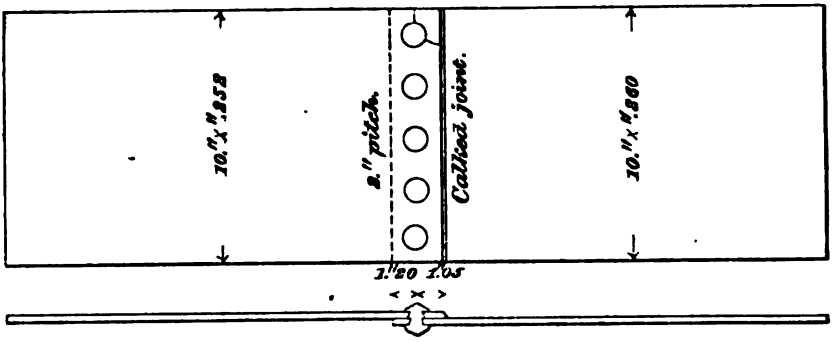
Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	27,630
Tensile strain on net section of plate	43,230
Compressive strain on bearing surface of rivets	76,140
Shearing strain on rivets	34,900

No. 36.—¼" IRON PLATE. JOINT A . .



⅝" iron rivets, "Burden's best."
Punched holes: Punch, ".695 diameter; die, ".752 diameter.

	Square inches.
Gross sectional area of plate	2.52
Net sectional area of plate	1.63
Bearing surface of rivets	.895
Shearing area of rivets (".70 diameter)	1.92

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0009		
15,000	.0018		
20,000	.0028		
25,000	.0040		
30,000	.0058		
35,000	.0078		
5,000		.0018	
38,000	.0088		
40,000	.0103		
42,000	.0117		
44,000	.0130		
46,000	.0148		
48,000	.0163		Joint open at calking about ".01.
50,000	.0198		
52,000	.0253		
54,000	.0308		
56,000	.0378		
58,000	.0458		
60,000	.0537		Joint open about ".04 to ".05.
62,000	.0613		
64,000	.0708		
66,000	.0800		
68,000	.0920		
74,200			Ultimate strength.

Joint failed by shearing four rivets, and tore out upper plate at one end rivet.

Fractures started at end of lap in each plate and opposite each rivet but one.

All the sheared rivets had fractures started under the heads.

Elongation of holes from ".04 to ".08.

Holes with the die-side in, stretching the most.

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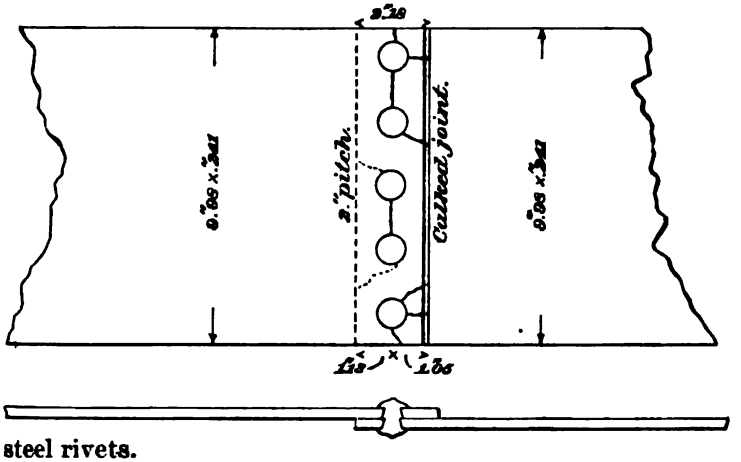
Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	29,444
Tensile strain on net section of plate	45,520
Compressive strain on bearing surface of rivets	82,910
Shearing strain on rivets	38,640

No. 41.—¼" Iron Plate. Joint A A .



5/16" steel rivets.

Punched holes: Punch, ".69 diameter; die, ".75 diameter.

	Square inch.
Gross sectional area of plate	2.41
Net sectional area of plate	1.54
Bearing surface of rivets	0.868
Shearing area of rivets (".70 diameter)	1.92

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inches.*	*Inches.*	
5,000	.0		
10,000	.0012		
15,000	.0028		
20,000	.0041		
25,000	.0062		
30,000	.0090		
35,000	.0120		
5,000		.0040	
28,000	.0149		
40,000	.0161		Perceptible starting of the joint.
42,000	.0180		Joint open about ".00½".
44,000	.0210		
46,000	.0238		Joint open ".01.
48,000	.0260		Joint open ".02.
50,000	.0289		
52,000	.0329		
54,000	.0356		Joint open about ".03½".
56,000	.0400		
58,000	.0438		
60,000	.0480		Joint open ".05.
62,000	.0528		
64,000	.0589		
66,000	.0650		
68,000	.0790		
70,000	.0880		
72,000	.0970		
74,000	.1080		
75,800	.1240		
76,100			Ultimate strength.

Fractures appeared first at end of upper plate opposite the outside rivets, shown at A . on the sketch.

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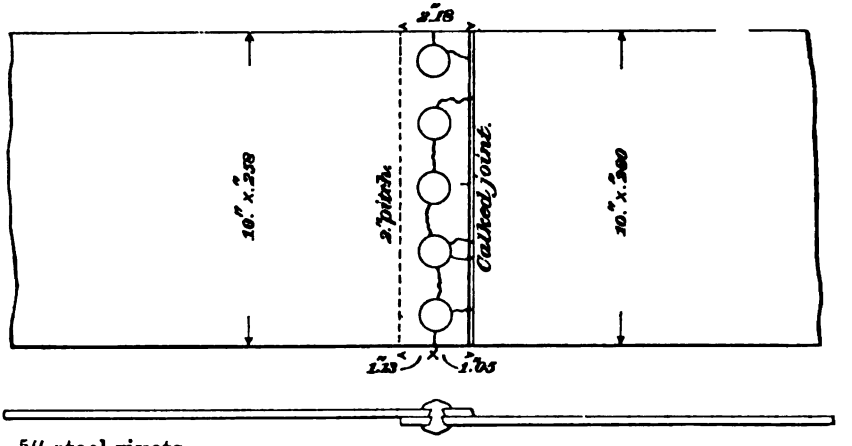
The upper plate tore out behind three rivets; the lower plate at two rivets.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	31,580
Tensile strain on net section of plate	49,420
Compressive strain on bearing surface of rivets	87,670
Shearing strain on rivets	39,640

No. 42.—¼″ Iron Plate. Joint A A . .



⅝″ steel rivets.

Punched holes: Punch, ″.69 diameter; die, ″.75 diameter.

	Square inches.
Gross sectional area of upper plate	2.58
Net sectional area of upper plate	1.65
Bearing surface of rivets	.929
Shearing area of rivets (″.70 diameter)	1.92

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0010		
15,000	.0020		
20,000	.0030		
25,000	.0052		
30,000	.0072		
35,000	.0102		
5,000		.0045	
38,000	.0128		
40,000	.0140		Joint started perceptibly.
42,000	.0159		
44,000	.0180		
46,000	.0210		
48,000	.0238		
50,000	.0260		Joint opened ″.01.
52,000	.0290		
54,000	.0335		Joint opened ″.02.
56,000	.0370		Joint opened ″ 03.
58,000	.0420		
60,000	.0468		
62,000	.0530		Joint open about ″.04.
64,000	.0600		Joint open about ″.05.
66,000	.0698		Joint open about ″.06.
68,000	.0780		
70,000	.0870		
74,000	.1085		
76,000	.1215		
77,980	.1410		Ultimate strength.

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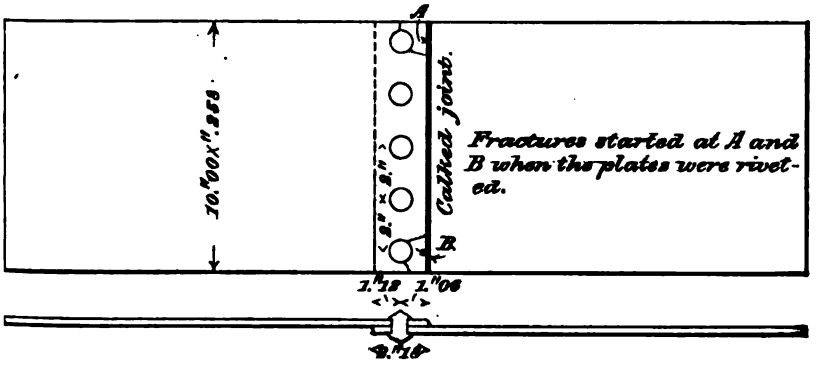
Joint failed by tearing apart upper plate similar to A A., fractures first appearing at end of upper opposite the outside rivets.

The under plate has a slight fracture at end of lap opposite the second rivet.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	30,220
Tensile strain on net section of upper plate	47,260
Compressive strain on bearing surface of rivets	83,940
Shearing strain on rivets	40,610

No. 37.—¼″ Iron Plate. Joint C.



⅝″ iron rivets, "Burden's best."
Drilled holes, ".69 diameter.

	Square inches.
Gross sectional area, upper plate	2.58
Gross sectional area, lower plate	2.44
Net sectional area, upper plate	1.69
Bearing surface of rivets, upper plate	.89
Shearing area of rivets (".69 diameter)	1.87

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.	.....	
10,000	.0015	.....	
15,000	.0027	.....	
20,000	.0042	.....	
25,000	.0059	.....	
30,000	.0082	.....	
35,000	.0112	.....	
5,000	.....	.0036	
38,000	.0135	.....	
40,000	.0149	.....	
42,000	.0172	.....	
44,000	.0197	.....	
46,000	.0226	.....	
48,000	.0225	.....	
50,000	.0292	.....	Calked joint is open about ".02. Scale on rivet heads slightly started.
52,000	.0322	.....	
54,000	.0429	.....	
56,000	.0527	.....	
58,000	.0632	.....	
60,000	.0749	.....	
5,000	.....	.0577	
62,000	.0885	.....	
64,000	.1305	.....	
65,200	.....	.....	Ultimate strength.

Failed by shearing three inside rivets and tearing out plate at the end rivets of the upper plate.

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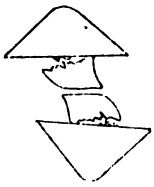
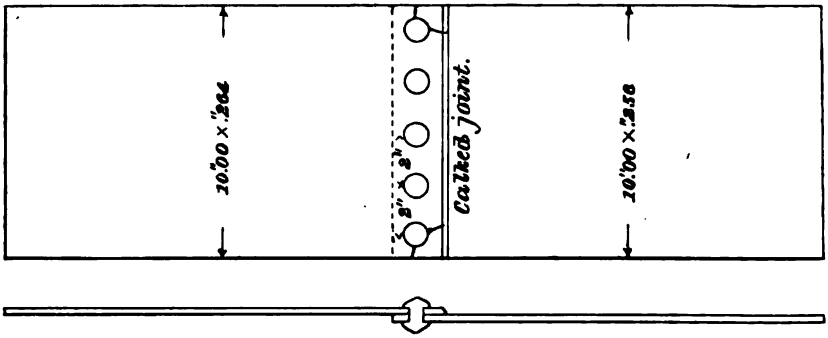
Rivets that were sheared were also fractured under the head.



Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	25,270
Tensile strain on net section of upper plate	38,580
Compressive strain on bearing surface of rivets	73,260
Shearing strain on rivets	34,870

No. 38.—¼″ Iron Plate. Joint C . .



⅝″ iron rivets, "Burden's best."
Drilled holes, ".69 diameter.

	Square inches.
Gross sectional area, upper plate	2.64
Net sectional area, upper plate	1.73
Bearing surface of rivets, upper plate	.911
Shearing area of rivets (".69 diameter)	1.87

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5, 000	0.		
10, 000	.0013		
15, 000	.0020		
20, 000	.0033		
25, 000	.0045		
30, 000	.0063		
35, 000	.0085		
5, 000		.0023	
38, 000	.0100		
40, 000	.0107		
42, 000	.0124		Joint opened ".01, or less.
44, 000	.0137		
46, 000	.0163		
48, 000	.0184		
50, 000	.0210		Scale has started on second rivet head.
52, 000	.0235		
54, 000	.0270		
56, 000	.0317		
58, 000	.0445		
60, 000	.0517		
62, 000	.0605		
64, 000	.0705		
66, 000	.0815		
68, 000	.0957		
70, 000	.1135		
72, 300			Ultimate strength.

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Fractured in the same manner as C., by shearing the three inside rivets and tearing out the plate at the end rivets.

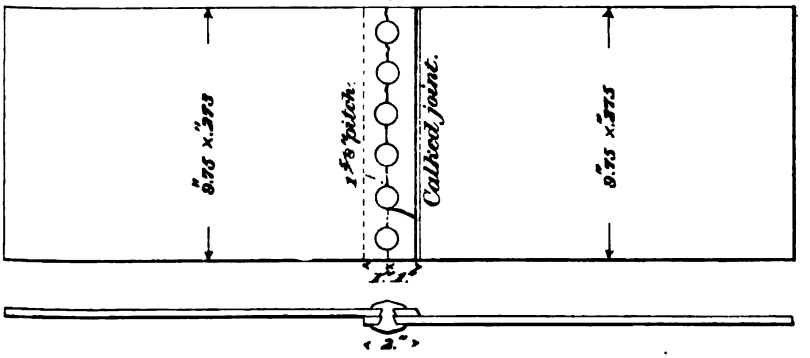
This method of failure would indicate the ability of the plate to shear all the rivets in case the metal at the sides of the specimen was supported and prevented from spreading.

Holes elongated from ".06 to ".08.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	27,380
Tensile strain on net section of upper plate	41,790
Compressive strain on bearing surface of rivets	79,360
Shearing strain on rivets	38,660

No. 39.—¼" Iron Plate. Joint D.



⅝" iron rivets, "Burden's best."

Punched holes: Punch, ".695 diameter; die, ".752 diameter.

	Square inches.
Gross sectional area of plate	2.66
Net sectional area of plate	1.48
Bearing surface of rivets	1.18
Shearing area of rivets (".70 diameter)	2.31

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.	.....	
10,000	.0010	.....	
15,000	.0021	.....	
20,000	.0036	.....	
25,000	.0051	.....	
30,000	.0071	.....	
35,000	.0101	.....	
5,000	.....	.0029	
38,000	.0117	.....	
40,000	.0132	.....	
42,000	.0151	.....	
44,000	.0171	.....	
46,000	.0193	.....	
48,000	.0223	.....	
50,000	.0251	.....	
52,000	.0293	.....	
54,000	.0331	.....	
56,000	.0373	.....	
58,000	.0422	.....	
60,000	.0501	.....	
62,000	.0571	.....	
64,000	.0651	.....	
66,000	.0760	.....	
68,000	.0830	.....	
70,000	.0960	.....	
72,000	.1060	.....	
77,200	.....	.....	Ultimate strength.

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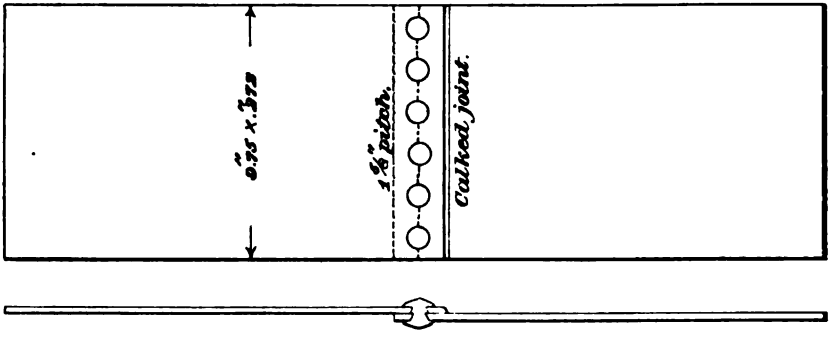
Joint failed by fracturing the upper plate across five sections and the under plate across two sections of the plate between rivet holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	29,020
Tensile strain on net section of plate	52,160
Compressive strain on bearing surface of rivets	65,420
Shearing strain on rivets	33,420

No. 40.—¼″ Iron Plate. Joint D . .



⅝″ iron rivets, "Burden's best."
Punched holes: Punch, ".695 diameter; die, ".752 diameter.

	Square inches.
Gross sectional area of plate	2.65
Net sectional area of plate	1.48
Bearing surface of rivets	1.18
Shearing area of rivets	2.31

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0007		
15,000	.0020		
20,000	.0032		
25,000	.0050		
30,000	.0070		
35,000	.0094		
5,000		.0032	
38,000	.0114		
40,000	.0132		
42,000	.0150		
44,000	.0167		
46,000	.0192		
48,000	.0217		
50,000	.0252		
52,000	.0292		
54,000	.0322		
56,000	.0358		
58,000	.0397		
60,000	.0462		
62,000	.0510		
64,000	.0572		
66,000	.0640		
68,000	.0714		Joint about ".05 open.
70,000	.0807		
72,000	.0912		
74,000	.1000		
81,300			Ultimate strength.

Joint failed by fracturing the lower plate square across through line of rivet holes.

Fractures started slightly at end of plate opposite two rivets.

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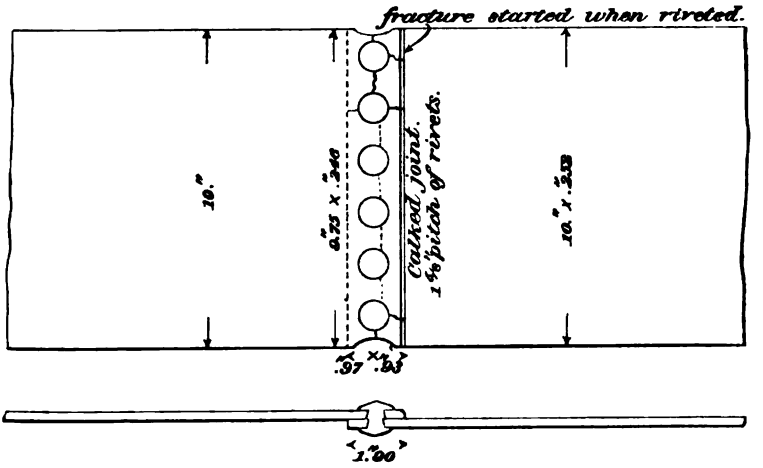
Maximum loads on joint.

	Pounds. per sq. inch.
Tensile strain on gross section of plate	30,680
Tensile strain on net section of plate	54,930
Compressive strain on bearing surface of rivets	68,890
Shearing strain on rivets	35,200

No. 43.—¼″ Iron Plate. Joint D D.



½″ tool steel rivets.
Punched holes: Punch, ″.568 diameter; die, ″.636 diameter.

	Square inches.
Gross sectional area of upper plate	2.40
Net sectional area of upper plate	1.51
Bearing surface of rivets	.886
Shearing area of rivets (″.57 diameter)	1.53

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0007		
15,000	.0016		
20,000	.0033		
25,000	.0045		
30,000	.0070		
35,000	.0100		
5,000		.0035	
38,000	.0125		
40,000	.0136		Joint started perceptibly.
42,000	.0160		
44,000	.0185		
46,000	.0205		Joint open nearly ″.01.
48,000	.0245		
50,000	.0280		
5,000		.0165	
52,000	.0325		Joint open ″.02.
54,000	.0375		
56,000	.0435		Joint open ″.03.
58,000	.0515		
60,000	.0637		Joint open ″.04.
62,000	.0735		
64,000	.0873		Joint open ″.06.
66,000	.1040		
68,000	.1250		
69,300	.1555		Ultimate strength.

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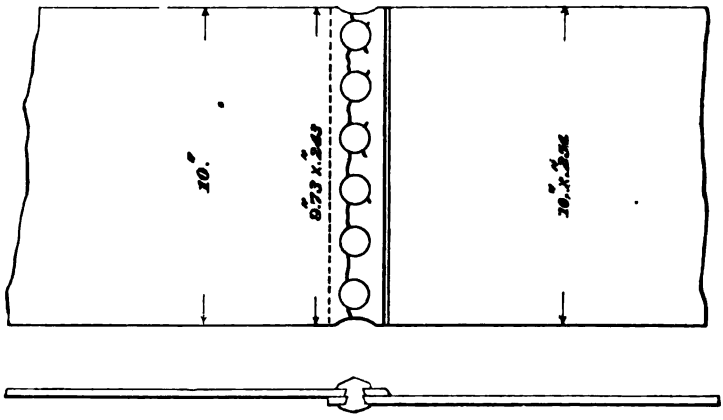
Joint failed by tearing out at two rivets in upper plate and through line of four rivets in under plate. The initial fracture caused by riveting was apparent by a source of weakness. Failure in the under plate appeared wholly due to fractures starting at the rivet holes and tearing till they met. In every case except one, fractures were started at the rivet holes; an examination of the fractured plates would indicate that the failure was due to the excessive compressive strain on the holes, and that by concentrating the strain on $\frac{1}{2}''$ rivets a smaller percentage of the full strength of the plate is obtained than by using $\frac{5}{8}''$ rivets, as was done in experiments D. and D.. It is observed that the fracture in the under plate did not follow a line through the center of the holes, but along a parallel line inside or on the side of the center line opposite the lap end.

The same remarks apply to the position of the fractures started about the rivet holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	28,875
Tensile strain on net section of upper plate	45,890
Compressive strain on bearing surface of rivets	78,220
Shearing strain on rivets	45,300

No. 44.—$\frac{1}{4}''$ IRON PLATE. JOINT D D..



$\frac{1}{2}''$ tool steel rivets.

Punched holes: Punch, ".568 diameter; die, ".636 diameter.

	Square inches.
Gross sectional area of upper plate	2.36
Net sectional area of upper plate	1.49
Bearing surface of rivets	.875
Shearing area of rivets (".57 diameter)	1.53

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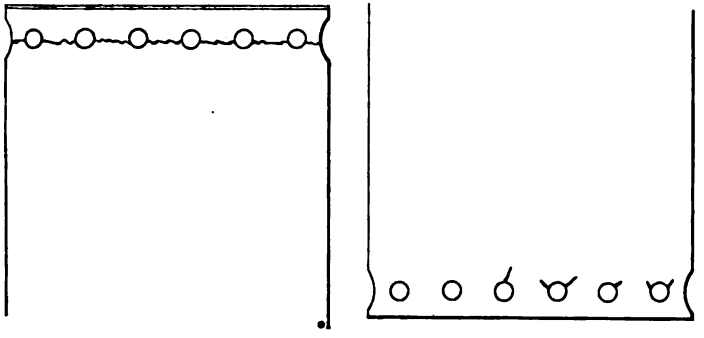
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0011		
15,000	.0022		
20,000	.0038		
25,000	.0055		
30,000	.0079		
35,000	.0110		
5,000		.0045	
38,000	.0130		
40,000	.0148		Perceptible movement in joint.
42,000	.0165		
44,000	.0185		
46,000	.0209		Joint open ".01.
48,000	.0240		
50,000	.0275		Joint open ".02.
52,000	.0312		
54,000	.0360		Joint open ".03.
56,000	.0408		
58,000	.0455		Joint open ".04.
60,000	.0525		
62,000	.0590		Joint open ".05.
64,000	.0678		
66,000	.0758		
68,000	.0832		
70,000	.0942		
72,000	.1070		
74,000	.1250		
74,080	.1278		Ultimate strength.

Fractured square across upper plate, along a line inside of the center line of rivet holes.

Fracture started about holes in lower plate, as shown by the following sketch:



The difference in strength, 4,780 pounds between D D . and D D . . is attributed to the weakening of joint D D . by the riveting at the end section which burst the plate at that place.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	31,390
Tensile strain on net section of upper plate	49,720
Compressive strain on bearing surface of rivets	84,660
Shearing strain on rivets	48,420

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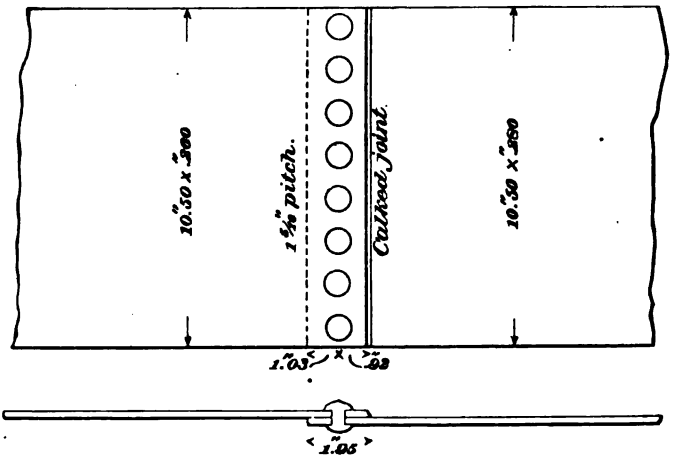
No. 45.—¼″ Iron Plate. Joint H.



Eight 7/16″ iron rivets, "Burden's best."
Drilled holes, ".50 diameter.

	Square inches.
Gross sectional area of upper plate	2.73
Net sectional area of upper plate	1.69
Bearing surface of rivets	1.04
Shearing area of rivets	1.57

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0008		
15,000	.0018		
20,000	.0030		
25,000	.0050		
30,000	.0090		
35,000	.0130		
5,000		.0068	
38,000	.0158		Joint started perceptibly; slight scaling of rivet heads.
40,000	.0180		
42,000	.0200		Joint open ".01.
44,000	.0235		
46,000	.0268		
48,000	.0305		Joint open ".02.
50,000	.0368		
52,000	.0420		Joint open ".03.
54,000	.0490		
56,000	.0560		
58,000	.0670		Joint open ".05.
60,000	.0758		Joint open ".06.
62,000	.0848		
63,000	.0928		Slight snapping sound.
69,450			Ultimate strength. Sheared the rivets.

Average elongation of rivet holes, ".07.
Fractures started in the outside sections of the plate.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	25,440
Tensile strain on net section of plate	41,095
Compressive strain on bearing surface of rivets	66,778
Shearing strain on rivets	44,204

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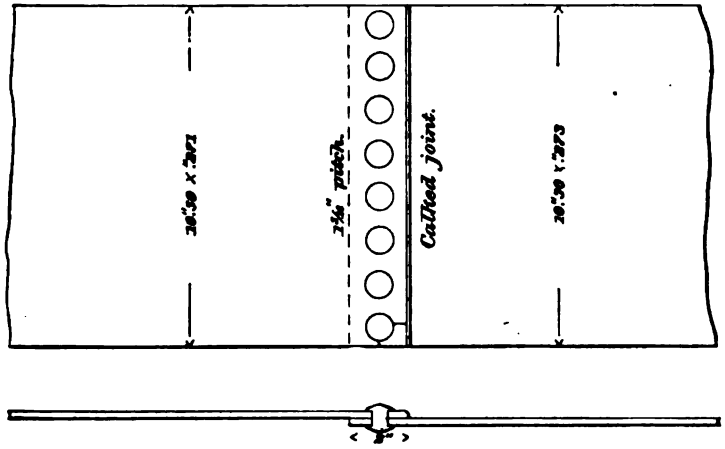
No. 46.—$\frac{1}{4}$" Iron Plate. Joint H..



Eight $\frac{7}{16}$" iron rivets, "Burden's best."
Drilled holes, $\frac{1}{2}$" diameter.

	Square inches.
Gross sectional area of upper plate	2.85
Net sectional area of upper plate	1.76
Bearing surface of rivets	1.084
Shearing area of rivets	1.57

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0005		
15,000	.0008		
20,000	.0018		
25,000	.0040		
30,000	.0070		
35,000	.0120		Scale starts on rivet heads.
5,000		.0072	
38,000	.0160		Joint started perceptibly.
40,000	.0178		
42,000	.0200		
44,000	.0235		
46,000	.0270		Joint open ".01.
48,000	.0335		
50,000	.0398		Joint open ".02.
5,000		.0290	
52,000	.0470		Joint open ".03.
54,000	.0572		Joint open ".04.
56,000	.0665		
58,000	.0770		Joint open ".07.
60,000	.0908		
62,000	.1070		
64,000	.1260		
66,000	.1500		Ultimate strength. Sheared seven rivets, tore out plate at one end rivet.

Fractures started about rivet holes.
Average elongation of holes ".09 in plate not fractured.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	23,158
Tensile strain on net section of plate	37,500
Compressive strain on bearing surface of rivets	60,886
Shearing strain on rivets	42,038

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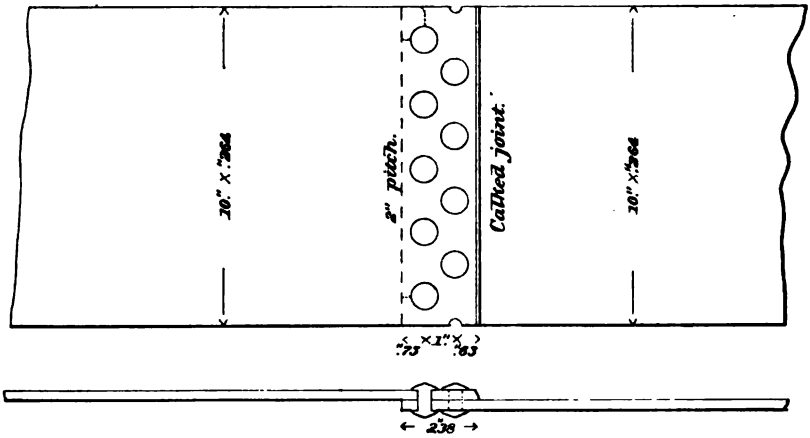
DOUBLE RIVETED LAP JOINTS ¼″ IRON PLATE.

No. 85.—¼″ Iron Plate. Joint I.



7/16″ iron rivets, "Burden's best."
Drilled holes, ".50 diameter.

	Square inches.
Gross sectional area of plate	2.64
Net sectional area of plate	1.98
Bearing surface of rivets	1.19
Shearing area of rivets	1.77

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0009		
20,000	.0030		
30,000	.0065		
40,000	.0128		
45,000	.0168		
50,000	.0212		
55,000	.0362		Joint opened perceptibly.
60,000	.0438		Joint opened ".01.
5,000.		.0315	Joint does not close.
65,000	.0600		Joint open ".03.
70,000	.0802		Joint open ".04.
72,000	.0950		Joint open ".06.
74,000	.1180		
76,300			Ultimate strength. Sheared eight rivets tore out plate at one end rivet, started fracture in plate at other end rivet.

Average elongation of holes, ".06.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross area of plate	28,900
Tensile strain on net area of plate	38,535
Compressive strain on bearing surface of rivets	64,120
Shearing strain on rivets	43,140

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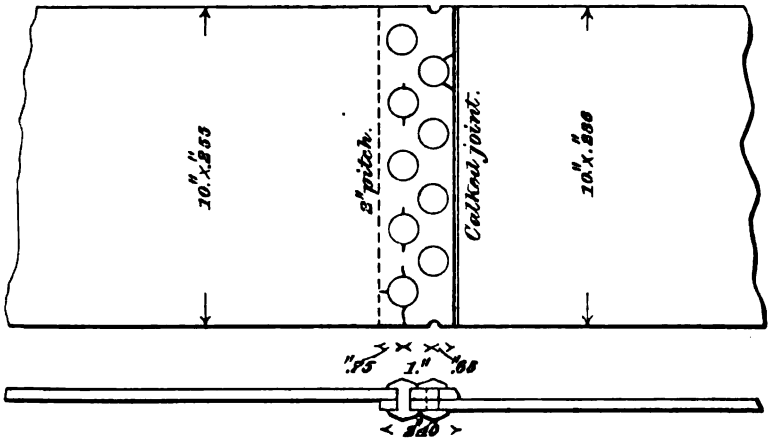
No. 86.—¼″ Iron Plate. Joint I . .



$\frac{7}{16}$″ iron rivets, "Burden's best."
Drilled holes, ".50 diameter.

	Square inches.
Gross sectional area of under plate	2.36
Net sectional area of under plate	1.77
Bearing surface of rivets	1.06
Shearing area of rivets	1.77

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0008		
20,000	.0025		
30,000	.0060		
35,000	.0098		
40,000	.0130		
45,000	.0170		
50,000	.0220		Joint opened perceptibly.
5,000		.0125	
55,000	.0335		Joint open ".01.
60,000	.0508		
65,000			
73.900			Ultimate strength. Sheared seven rivets, tore out plate at two rivets.

Fractures started about holes in upper plate in the row of five holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of under plate	31,314
Tensile strain on net section of under plate	41,750
Compressive strain on bearing surface of rivets	69,710
Shearing strain on rivets	41,750

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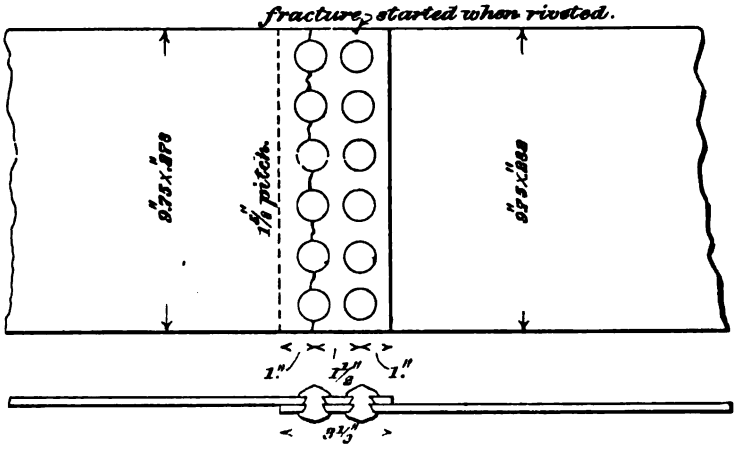
No. 617.—¼″ Wrought Iron Plate. Plates K.



⅜″ iron rivets, "Burden's best."
Punched holes: Punch, $\frac{9}{16}$″ diameter; die, $\frac{21}{32}$″ diameter.

	Square inches.
Gross sectional area of upper plate	2.71
Net sectional area of upper plate	1.69
Bearing surface of rivets	2.03
Shearing area of rivets	2.98

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0040		Plates not straight; marked in riveting.
20,000	.0145		
30,000	.0220		Elongations include the straightening of the metal.
35,000	.0260		
5,000		.0150	
40,000	.0300		
50,000	.0410		
60,000	.0500		
73,300	.0900		
76,900	.12		
85,500	.22		Ultimate strength.

Fractured upper plate across row of rivet holes. Started fractures in upper plate at end of lap.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	31,550
Tensile strain on net section of upper plate	50,592
Compressive strain on bearing surface of rivets	42,118
Shearing strain on rivets	28,691

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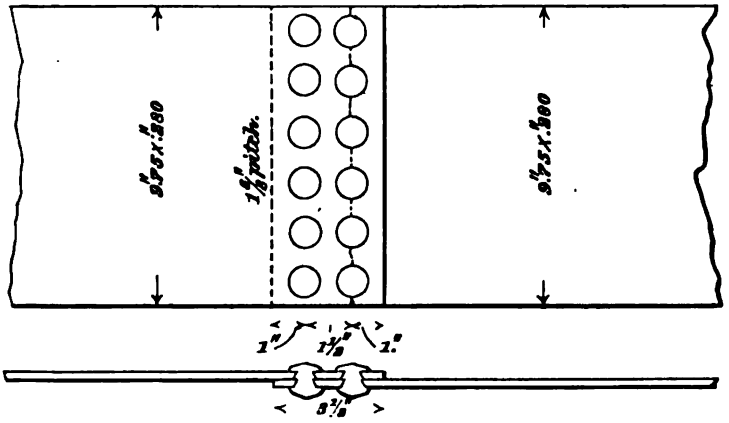
No. 618.—¼″ Iron Plate. Plates K . .

Duplicate of K .



½″ iron rivets, "Burden's best."
Punched holes: Punch, $\frac{9}{16}$″ diameter; die, $\frac{21}{32}$″ diameter.

	Square inches.
Gross sectional area of under plate	2.73
Net sectional area of under plate	1.71
Bearing surface of rivets	2.05
Shearing area of rivets	2.98

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.	.....	
10,000	.0009	.....	
20,000	.0030	.....	
30,000	.0065	.....	
35,000	.0088	.....	
5,000	.....	.0020	
40,000	.0110	.....	
45,000	.0145	.....	
50,000	.0190	.....	
5,000	.....	.0095	
55,000	.0228	.....	
60,000	.0280	.....	
65,000	.0350	.....	
70,000	.06	.....	
75,000	.10	.....	
80,000	.14	.....	
85,000	.19	.....	
85,400	.....	.....	Ultimate strength.

Fractured under plate across line of rivet holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of under plate	31,282
Tensile strain on net section of under plate	49,950
Compressive strain on bearing surface of rivets	41,660
Shearing strain on rivets	28,660

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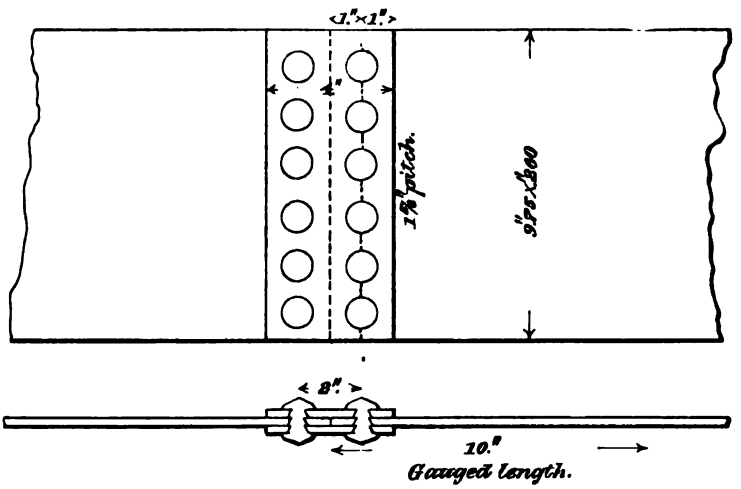
SINGLE-RIVETED BUTT JOINTS, ¼″ IRON PLATE.

No. 615.—¼″ Iron Plate Butt Joints. Plates L.



⅝″ iron rivets, "Burden's best."
Punched holes: Punch, 1 1/16″ diameter; die, ¾″ diameter.

	Square inches
Gross sectional area of plate	2.53
Net sectional area of plate	1.41
Bearing surface of rivets	1.12
Shearing area of rivets	4.45

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
10,000	0.		
15,000	.0010		
20,000	.0021		
25,000	.0035		
30,000	.0045		
35,000	.0055		
10,000		.0002	
40,000	.0075		
45,000	.0110		
50,000	.0130		
55,000	.0160		
60,000	.0190		
10,000		.0110	
70,000	.10		
75,000	.15		
75,400			Ultimate strength.

Fractured plate across line of rivet holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross sectional area of plate	29,800
Tensile strain on net sectional area of plate	53,475
Compressive strain on bearing surface of rivets	67,321
Shearing strain on rivets	16,944

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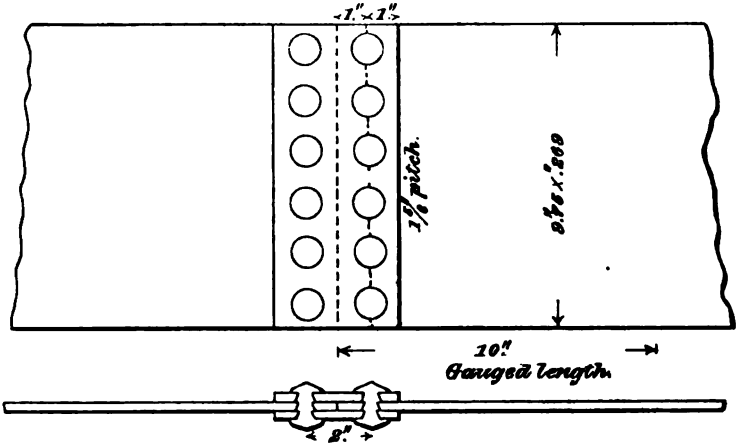
No. 616.—¼″ Iron Plate Butt Joint. Plates L . .

Duplicate of L .



⅝″ iron rivets, "Burden's best."
Punched holes: Punch, $\frac{1}{16}$″ diameter; die, ¾″ diameter.

	Square inches.
Gross sectional area of plate	2.62
Net sectional area of plate	1.46
Bearing surface of rivets	1.16
Shearing area of rivets	4.45

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0010		
20,000	.0028		
30,000	.0050		
35,000	.0060		
5,000		.0009	
40,000	.0070		
42,000	.0075		
44,000	.0080		
46,000	.0085		
48,000	.0090		
50,000	.0098		
52,000	.0105		
54,000	.0111		
56,000	.0121		
58,000	.0132		
60,000	.0150		
62,000	.0168		
64,000	.0180		
66,000	.0200		
68,000	.0255		
70,000	*.06		
74,400	.14		Ultimate strength.

* About ".06.

Fractured plate across line of rivet holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	28,397
Tensile strain on net section of plate	50,959
Compressive strain on bearing surface of rivets	64,138
Shearing strain on rivets	16,719

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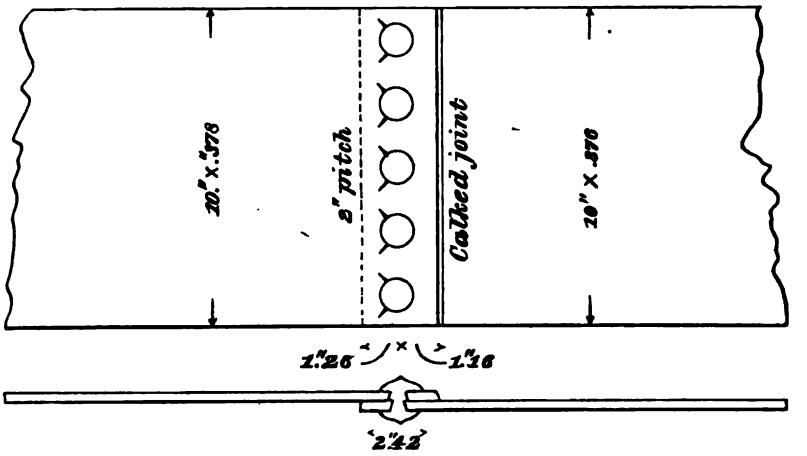
SINGLE-RIVETED LAP JOINTS ⅜″ IRON PLATE.

No. 62.—⅜″ IRON PLATES. JOINT A.



$\frac{11}{16}$″ iron rivets, "Burden's best."
Punched holes: Punch, ".753 diameter; die, ".774 diameter.

	Square inches.
Gross sectional area of plate	3.76
Net sectional area of plate	2.32
Bearing surface of rivets	1.44
Shearing area of rivets (.″76 diameter)	2.27

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0005		
20,000	.0018		
30,000	.0048		
35,000	.0070		
5,000		.0040	
40,000	.0100		Joint started slightly.
42,000	.0112		
44,000	.0128		
46,000	.0145		
48,000	.0160		
50,000	.0192		Joint open ".01. Scale starts on rivet heads about the same time the joint begins to open.
52,000	.0220		
54,000	.0248		
56,000	.0280		
58,000	.0320		
60,000	.0398		Joint open ".02.
62,000	.0458		Joint open ".03.
64,000	.0525		
66,000	.0588		Joint open ".04.
68,000	.0660		Joint open ".05.
70,000	.0740		
72,000	.0838		
74,000	.0938		
80,000	.1320		
85,000	.1810		
86,900			Ultimate strength. Sheared rivets.

Started fractures about rivet holes inside of center line of holes.
Average elongation of holes, ".04.

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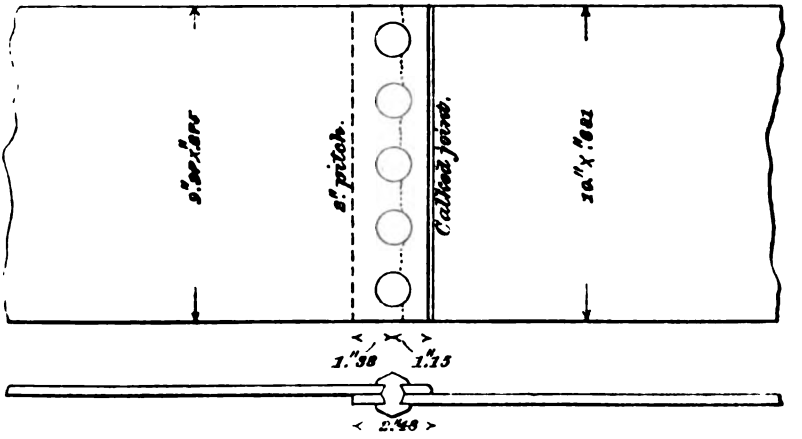
Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	23,110
Tensile strain on net section of plate	37,460
Compressive strain on bearing surface of rivets	60,340
Shearing strain on rivets	38,280

No. 63.—⅜″ Iron Plate. Joint A . .



⅛″ iron rivets, "Burden's best."
Punched holes: Punch, ".753 diameter; die, ".774 diameter.

	Square inches.
Gross sectional area of plate	3.81
Net sectional area of plate	2.35
Bearing surface of rivets	1.46
Shearing area of rivets (".78 diameter)	2.39

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0005		
20,000	.0012		
30,000	.0039		
35,000	.0065		
5,000		.0032	
40,000	.0090		
45,000	.0121		
50,000	.0170		Joint opened perceptibly.
55,000	.0240		Joint opened ".01.
60,000	.0389		
65,000	.0560		Joint opened ".02.
70,000	.0770		Joint opened ".04.
75,000	.1040		
80,000	.1400		
84,900			Ultimate strength. Fractured the under plate.

Fractures dull fibrous. Fractures started about the rivet holes in the upper plate.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	22,280
Tensile strain on net section of plate	36,130
Compressive strain on bearing surface of rivets	58,150
Shearing strain on rivets	35,520

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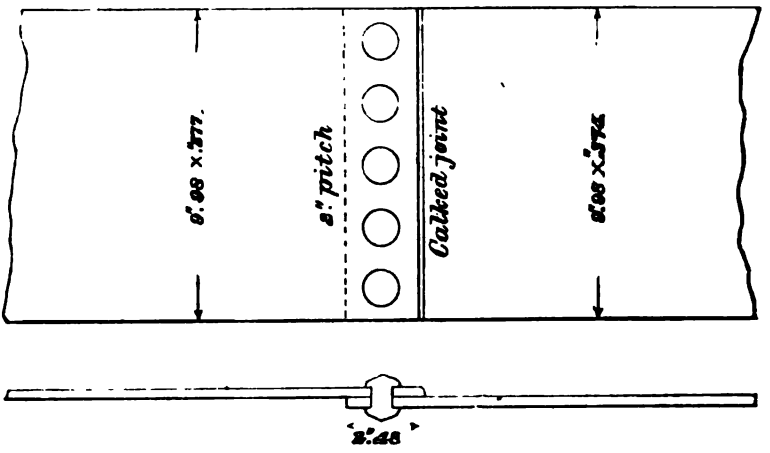
No. 64.—$\frac{3}{8}$" Iron Plate. Joint C.



$\frac{11}{16}$" iron rivets, "Burden's best."
Drilled holes, ".77 diameter.

	Square inches.
Gross sectional area of under plate	3.73
Net sectional area of under plate	2.29
Bearing surface of rivets	1.44
Shearing area of rivets (".77 diameter)	2.33

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0005		
20,000	.0012		
30,000	.0029		
35,000	.0042		
5,000		.0015	
40,000	.0090		
45,000	.0142		Joint opened slightly.
50,000	.0182		
5,000		.0118	
55,000	.0238		Joint open ".01.
60,000	.0350		Joint open ".02.
65,000	.0588		Joint open ".04.
70,000	.0798		
75,000	.1080		
87,450			Ultimate strength. Sheared rivets.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	23,445
Tensile strain on net section of plate	38,190
Compressive strain on bearing surface of rivets	60,739
Shearing strain on rivets	37,530

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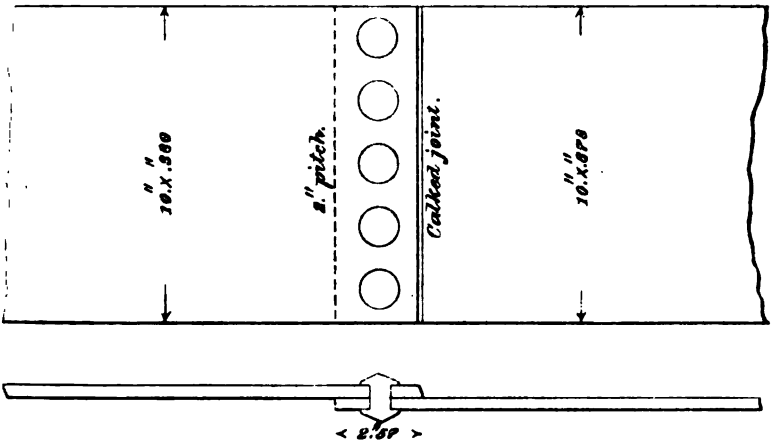
No. 65.—$\frac{3}{8}$" IRON PLATE. JOINT C . .



$\frac{11}{16}$" iron rivets, "Burden's best."
Drilled holes, ".77 diameter.

	Square inches.
Gross sectional area of under plate	3.78
Net sectional area of under plate	2.32
Bearing surface of rivets	1.46
Shearing area of rivets	2.33

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0010		
20,000	.0028		
30,000	.0062		
35,000	.0092		
5,000		.0040	
40,000	.0120		Joint opened perceptibly.
45,000	.0160		
50,000	.0230		Joint open ".01.
5,000		.0130	
55,000	.0328		Joint open ".02.
60,000	.0495		Joint open ".04.
65,000	.0680		Joint open ".05.
70,000	.0940		
75,000	.1260		
84,000			Ultimate strength. Sheared rivets.

Average elongation of drilled holes, ".05.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	22,220
Tensile strain on net section of plate	36,210
Compressive strain on bearing surface of rivets	57,530
Shearing strain on rivets	36,050

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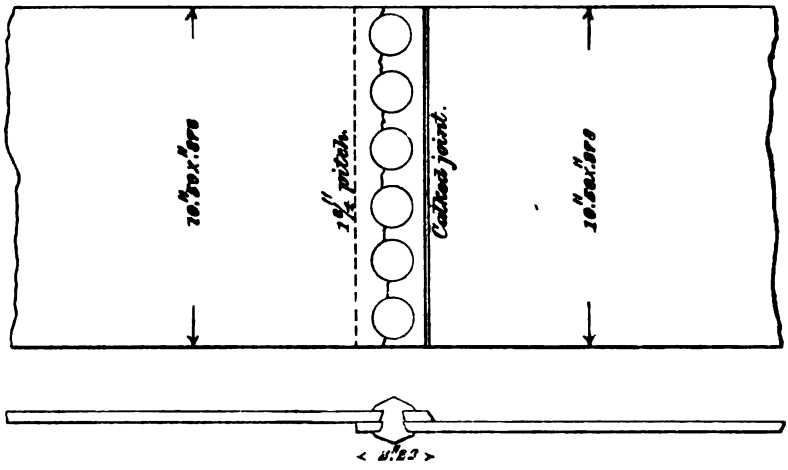
No. 66.—$\frac{3}{8}$" Iron Plate. Joint D.



$\frac{11}{16}$" iron rivets, "Burden's best."
Punched holes: Punch, ".753 diameter; die, ".774 diameter.

	Square inches
Gross sectional area of upper plate	3.95
Net sectional area of upper plate	2.23
Bearing surface of rivets	1.72
Shearing area of rivets	2.72

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0005		
20,000	.0018		
30,000	.0040		
35,000	.0060		
5,000		.0022	
40,000	.0082		
45,000	.0110		
50,000	.0150		
5,000		.0080	
55,000	.0202		Joint opened perceptibly.
60,000	.0250		
65,000	.0335		Joint open ".01.
70,000	.0460		Joint open ".02.
75,000	.0638		Joint open ".03.
80,000	.0850		Joint open ".05.
85,000	.1600		
93,100			Ultimate strength. Fractured plate.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross area of plate	23,570
Tensile strain on net area of plate	41,750
Compressive strain on bearing surface of rivets	54,130
Shearing strain on rivets	

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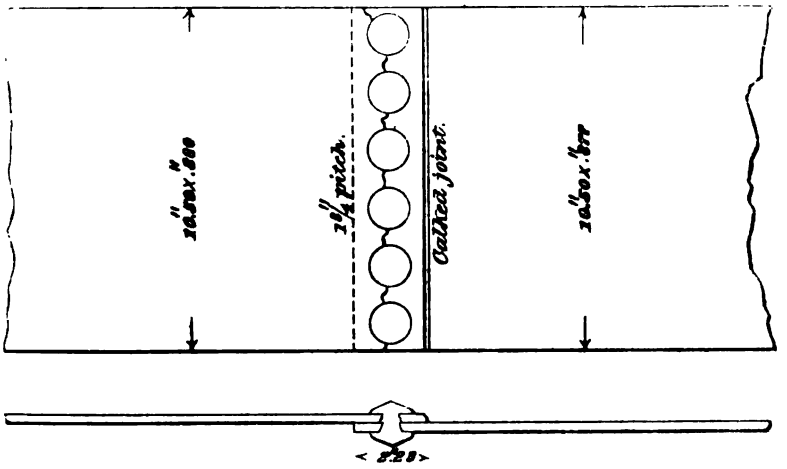
No. 67.—⅜″ IRON PLATE. JOINT D . .



1⅛″ iron rivets, "Burden's best."
Punched holes: Punch, ".753 diameter; die, ".774 diameter.

NOTE.—Before the test incipient fractures were observed at the side of the plates in the center line of the rivet holes, probably caused by the machine reveting.

	Square inches.
Gross sectional area of upper plate	3.99
Net sectional area of upper plate	2.25
Bearing surface of rivets	1.74
Shearing area of rivets (".76 diameter)	2.72

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0068		
20,000	.0028		
30,000	.0055		
35,000	.0078		
5,000		.0025	
40,000	.0108		
45,000	.0140		
50,000	.0180		
5,000		.0080	
55,000	.0235		
60,000	.0320		Joint opened perceptibly.
65,000	.0430		Joint open ".01.
70,000	.0585		Joint open ".02.
75,000	.0745		Joint open ".03.
80,000	.1180		
92,900			Ultimate strength. Fractured upper plate.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	23,280
Tensile strain on net section of plate	41,290
Compressive strain on bearing surface of rivets	53,400
Shearing strain on rivets	34,150

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No. 721.—⅜″ Iron Plate. Set K . .

Duplicate of K . No. 720.

Upper plate, 10″.32 × ″.395.
Under plate, 10″.32 × ″.395.
1″ iron rivets, hand-driven.
Punched holes: Punch, $1\frac{1}{16}$″ diameter; die, $1\frac{5}{32}$″ diameter.

	Square inches
Gross sectional area of under plate	4.08
Net sectional area of under plate	1.88
Bearing surface of rivets	2.19
Shearing area of rivets	4.43

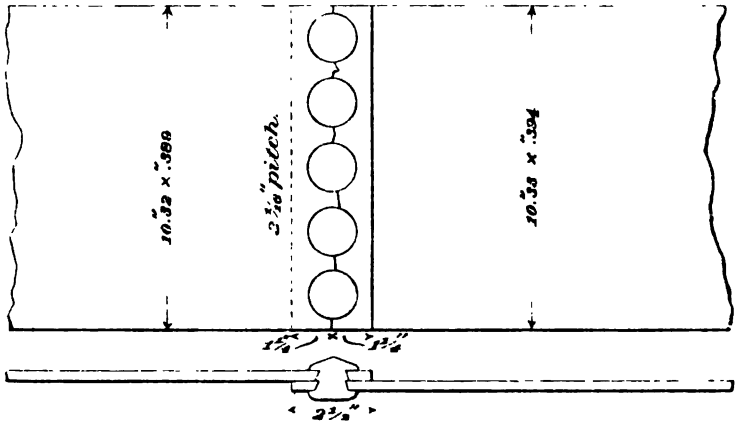
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0015		
20,000	.0040		
30,000	.0080		
35,000	.0098		
40,000	.0125		
45,000	.0155		
50,000	.0200		
55,000	.0240		
60,000	.0296		
65,000	.0350		
70,000	.0455		
75,000	.0560		
80,000	.0670		
90,000	.10		
100,000	.15		
110,000	.21		Ultimate strength.

Fractured under plate across line of rivet holes. Broke suddenly.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of under plate	26,960
Tensile strain on net section of under plate	58,510
Compressive strain on bearing surface of rivets	50,220
Shearing strain on rivets	24,830

No. 720.—⅜″ Iron Plate. Set K .



1″ iron rivets, hand-driven.
Punched holes: Punch, $1\frac{1}{16}$″ diameter; die, $1\frac{5}{32}$″ diameter.

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	Square inches.
Gross sectional area of under plate	4.07
Net sectional area of under plate	1.88
Bearing surface of rivets	2.19
Shearing area of rivets	4.43

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
50,000	.03		
60,000	.05		
70,000	.06		
80,000	.07		
90,000	.08		
100,000	.12		
110,000	.19		
116,000	.25		Ultimate strength.

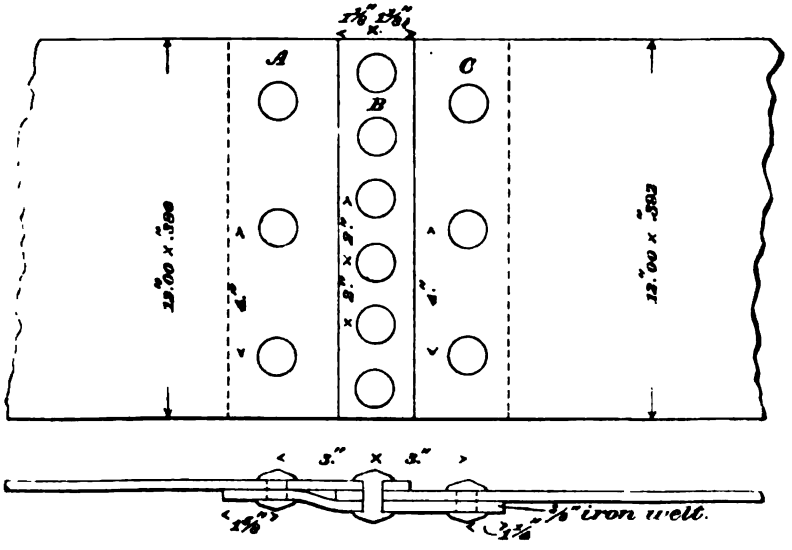
Joint failed suddenly, fracturing under plate across line of rivet holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of under plate	28,500
Tensile strain on net section of under plate	61,700
Compressive strain on bearing surface of rivets	52,970
Shearing strain on rivets	26,180

SINGLE-RIVETED LAP JOINTS WITH REINFORCED WELT. ⅜″ IRON PLATE.

No. 244.—⅜″ IRON PLATE. JOINT J.



⅝″ iron rivets, "Burden's best."
Drilled holes, ".72 diameter.
Welt, ⅜″ iron plate.

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	Square inches.
Gross sectional area of upper plate	4.63
Net sectional area of upper plate through line rivets *B*	2.96
Net sectional area of upper plate through line rivets *A*	3.89
Bearing surface of rivets, upper plate	2.50
Shearing area of rivets (9 rivets), single shear	3.66

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0005		
20,000	.0018		
30,000	.0032		
35,000	.0040		
5,000		.0005	
40,000	.0050		
45,000	.0062		
50,000	.0072		
55,000	.0088		
60,000	.0105		
5,000		.0030	
65,000	.0129		Scale started around outside rows of rivets.
70,000	.0150		
75,000	.0175		
80,000	.0198		
85,000	.0220		
90,000	.0240		
95,000	.0278		
100,000	.0310		
5,000		.0181	
105,000	.0400		Micrometer removed.
110,000	.05		
115,000	.06		
120,000	.06		
125,000	.08		
130,000	.11		
135,000	.14		
140,000	.17		
145,000	.25		
147,760			Ultimate strength. Sheared nine rivets, rows *A* and *B*.

"Cooper lines" run from rivets in row *A*, at an angle of 53 degrees with direction of pull on the specimen.

Elongation of holes, row *A*, ".08; row *B*, ".03.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	31,900
Tensile strain on net section of upper plate through line of rivet holes *B*	49,900
Tensile strain on net section of upper plate through line of rivet holes *A*	38,870
Compressive strain on bearing surface of rivets	59,080
Shearing strain on rivets (9 rivets)	40,360

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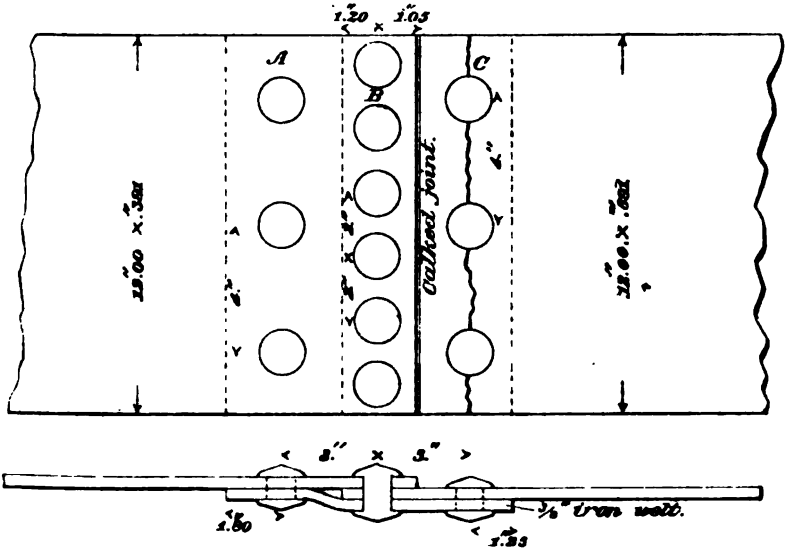
No. 245.—$\frac{3}{8}$″ Iron Plate. Joint J . .



$\frac{3}{4}$″ iron rivets, "Burden's best."
Drilled holes, ".82 diameter.
Welt, $\frac{3}{8}$″ iron plate.

	Square inches.
Gross sectional area of under plate	4.69
Net sectional area of under plate through line of rivet holes *B*	2.77
Net sectional area of under plate through line of rivet holes *C*	3.74
Bearing surface of nine rivets (".82 diameter)	2.89
Shearing area of nine rivets, single shear	4.75

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0005		
20,000	.0011		
30,000	.0025		
35,000	.0030		
5,000		.0005	
40,000	.0038		
50,000	.0050		
60,000	.0070		
5,000		.0019	
70,000	.0120		
75,000	.0150		
80,000	.0175		Joint opened perceptibly.
85,000	.0195		
90,000	.0220		Joint open ".01.
95,000	.0245		
100,000	.0280		
5,000		.0165	
105,000	.0310		
110,000	.0350		
115,000	.0435		Joint open ".02.
120,000	.0550		Micrometer removed.
125,000	.07		
130,000	.09		Joint open about ".04.
135,000	.10		
140,000	.13		
145,000	.18		
162,700			Ultimate strength. Fractured lower plate through outside line of rivet holes.

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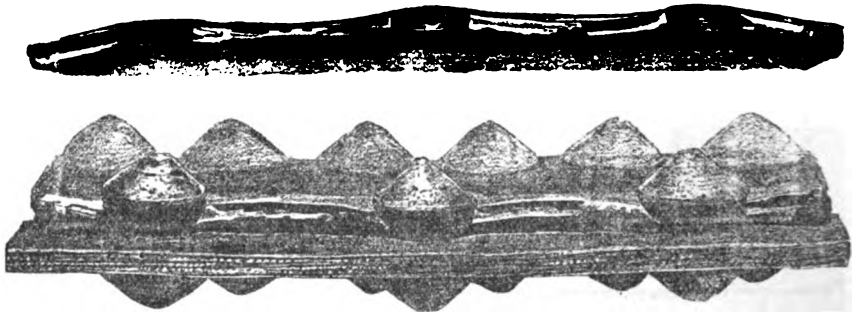
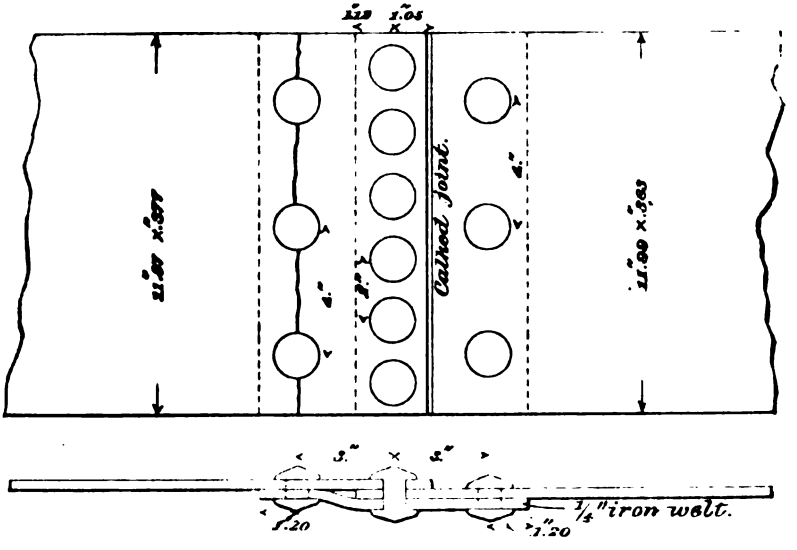
Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of under plate	34, 900
Tensile strain on net section of under plate through line of rivets *B*	59, 100
Tensile strain on net section of under plate through line of rivets *C*	43, 770
Compressive strain on bearing surface of rivets (9)	56, 640
Shearing strain on nine rivets (single shear)	34, 460



Photograph Joint No. 245.

No. 296.—⅜″ Iron Plate. Joint J J.



¾″ iron rivets, "Burden's best."
Drilled holes, ".82 diameter.

	Square inches.
Gross sectional area of upper plate	4. 51
Net sectional area of upper plate through line of three rivet holes	3. 59
Bearing surface of rivets	2. 78
Shearing area of rivets (single shear, 9 rivets)	4. 75

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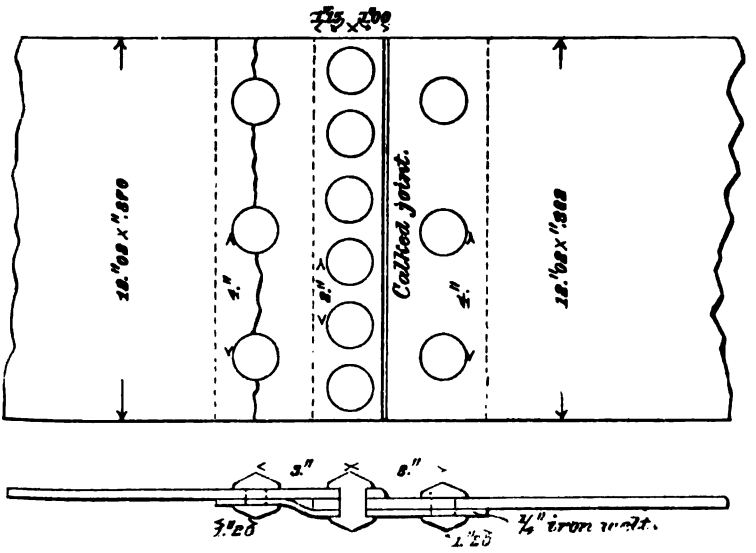
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0002		
20,000	.0010		
30,000	.0020		
35,000	.0030		
5,000		.0005	
40,000	.0038		
50,000	.0068		
60,000	.0108		
70,000	.0150		
80,000	.0190		
90,000	.0245		
100,000	.0318		
110,000	.0430		
120,000	.07		
130,000	.10		
140,000	.16		
161,000			Ultimate strength.

Fractured upper plate through rivet holes line *A*.
Fibrous fracture.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	35,700
Tensile strain on net section of upper plate across row of three rivet holes	44,840
Compressive strain on bearing surface of rivets	57,910
Shearing strain on rivets (9 rivets, single shear)	33,890

No. 297.—$\frac{3}{8}$" Iron Plate. Joint J J . .



$\frac{3}{8}$" iron rivets, "Burden's best."
Drilled holes, ".82 diameter.

	Square inches.
Gross sectional area of upper plate	4.45
Net sectional area of upper plate through line of three rivet holes	3.54
Bearing surface of rivets	2.73
Shearing area of rivets (single shear, 9 rivets)	4.75

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Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0005		
20,000	.0018		
30,000	.0030		
35,000	.0038		
5,000		.0005	
40,000	.0045		
45,000	.0050		
50,000	.0060		
55,000	.0070		
60,000	.0090		
65,000	.0115		
70,000	.0145		
75,000	.0180		
80,000	.0208		
85,000	.0230		
90,000	.0268		
95,000	.0292		
100,000	.0340		
110,000	.0470		
120,000	.08		
130,000	.11		
140,000	.17		
151,100			Ultimate strength.

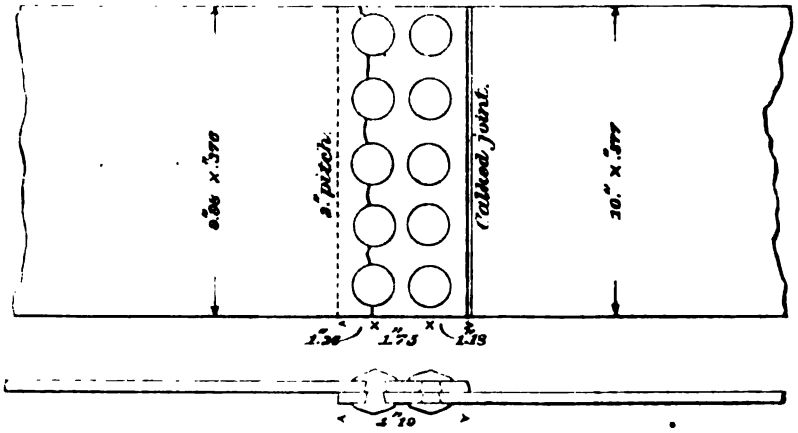
Fractured upper plate through outside row of rivet holes. Fibrous fracture.

Maximum loads on joint.

	Pounds per sq. inch
Tensile strain on gross section of upper plate	33,950
Tensile strain on net section of upper plate through row of three rivet holes	42,680
Compressive strain on bearing surface of rivets	55,350
Shearing strain on rivets	31,810

DOUBLE-RIVETED LAP JOINTS $\frac{3}{8}$" IRON PLATE.

No. 68.—$\frac{3}{8}$" IRON PLATE. JOINT F.



$\frac{11}{16}$" iron rivets, "Burden's best."
Punched holes: Punch, ".753 diameter; die, ".774 diameter.

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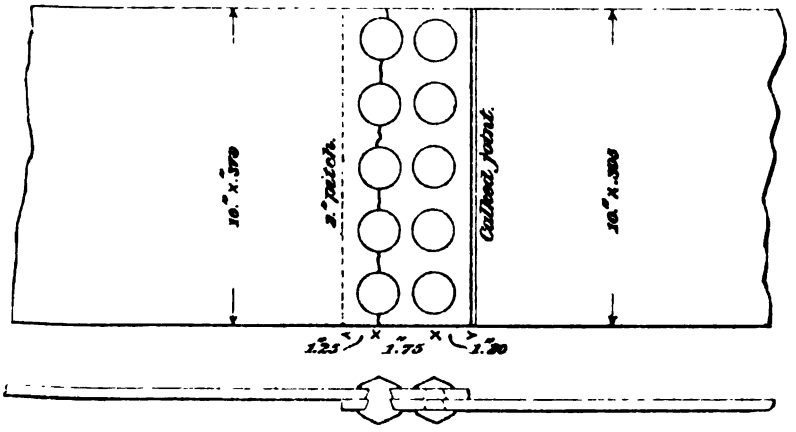
	Square inches.
Gross sectional area of upper plate	3.75
Net sectional area of upper plate	2.32
Bearing surface of rivets	2.87
Shearing area of rivets (".76 diameter)	4.54

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0005		
20,000	.0020		
30,000	.0040		
35,000	.0050		
5,000		.0010	
40,000	.0068		
45,000	.0080		
50,000	.0100		
55,000	.0125		
60,000	.0155		
65,000	.0195		Joint opened perceptibly.
70,000	.0238		Joint open ".01.
5,000		.0140	
75,000	.0285		Joint open ".03.
80,000	.0335		Joint open ".04.
85,000	.0392		
90,000	.0460		Joint open ".05.
95,000	.0530		
112,400			Ultimate strength. Fractured upper plate.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross area of plate	29,970
Tensile strain on net section of plate	48,450
Compressive strain on bearing surface of rivets	39,160
Shearing strain on rivets	24,760

No. 69.—⅜" Iron Plate. Joint F . .



⅞" iron rivets, "Burden's best."
Punched holes: Punch, ".753 diameter; die, ".774 diameter.

	Square inches.
Gross sectional area of upper plate	3.79
Net sectional area of upper plate	2.34
Bearing surface of rivets	2.89
Shearing area of rivets (".76 diameter)	4.54

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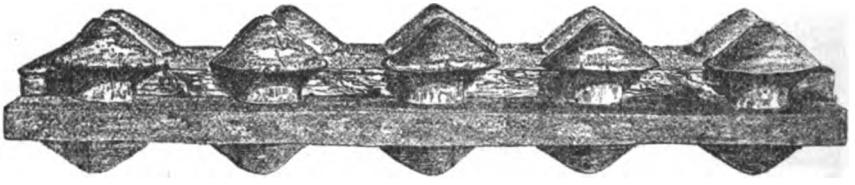
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,00	0.	.....	
10,000	.0005	.....	
20,000	.0020	.....	
30,000	.0032	.....	
35,000	.0045	.....	
5,000	.....	.0006	
40,000	.0058	.....	
45,000	.0071	.....	
50,000	.0082	.....	
55,000	.0102	.....	
60,000	.0125	.....	
65,000	.0151	.....	
70,000	.0182	.....	Joint opened perceptibly.
5,000	.....	.0070	
75,000	.0231	.....	
80,000	.0280	.....	Joint open ".01+.
85,000	.0340	.....	Joint open ".02.
90,000	.0400	.....	Joint open ".03.
95,000	.0485	.....	
118,700	.....	.....	Ultimate strength. Fractured upper plate.

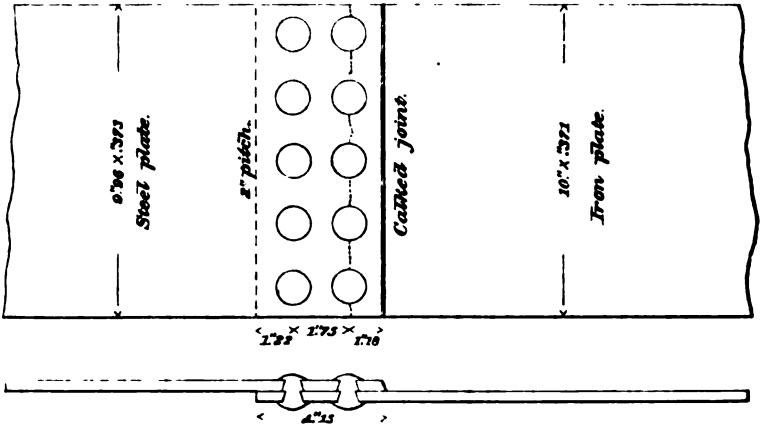
Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross area of plate	31,320
Tensile strain on net area of plate	50,730
Compressive strain on bearing surface of rivets	41,070
Shearing strain on rivets	26,150



Photograph of fractured plate, Joint No. 69, showing eccentricity of rivet heads; also showing scale started off rivet heads caused by the bending of the joint plates.

No. 58.—⅜″ Iron and Steel Plate. Joint F . . .



$\frac{11}{16}$″ iron rivets, "Burden's best."
Punched holes: Punch, ".753 diameter; die, ".774 diameter.

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	Square inches.
Gross sectional area of iron plate	3.71
Net sectional area of iron plate	2.29
Bearing surface of rivets	2.83
Shearing area of rivets (".76 diameter)	4.54

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0010		
20,000	.0025		
30,000	.0042		
40,000	.0070		
45,000	.0081		
50,000	.0100		
5,000		.0038	
55,000	.0120		
60,000	.0140		Joint opened perceptibly.
65,000	.0162		
70,000	.0192		Joint open ".01.
5,000		.0090	
75,000	.0238		Joint open ".02.
80,000	.0280		
85,000	.0329		Joint open ".03.
90,000	.0378		
5,000		.0258	
95,000	.0435		Joint open ".04.
100,000	.0508		Joint open ".05.
105,000	.0608		
110,000	.0768		
115,000	..		Ultimate strength.

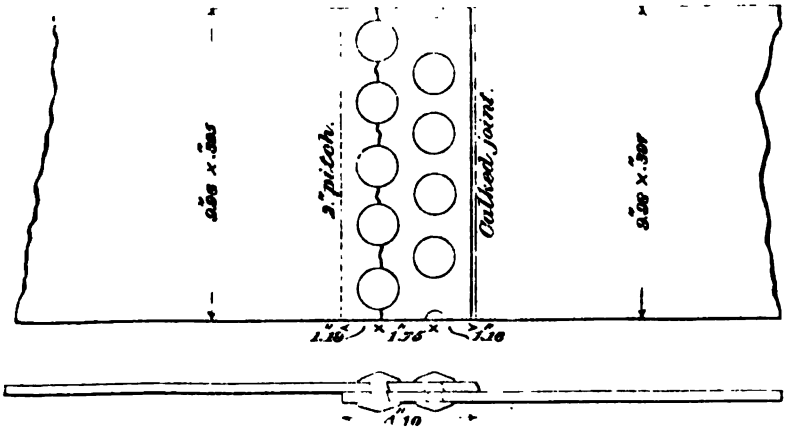
Fractured lower plate across line of rivet holes. Fibrous fractures, metal slightly drawn down.

NOTE.—Through mistake an iron and a steel plate were riveted together.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of iron plate	31,000
Tensile strain on net section of iron plate	50,220
Compressive strain on bearing surface of rivets	40,640
Shearing strain on rivets	25,330

No. 70.—$\frac{3}{8}$" IRON PLATE. JOINT G.



$\frac{11}{16}$" iron rivets, "Burden's best."
Punched holes: Punch, ".753 diameter; die, ".774 diameter.

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	Square inches.
Gross sectional area of upper plate	3.94
Net sectional area of upper plate	2.43
Bearing surface of rivets	2.71
Shearing area of rivets (".76 diameter)	4.08

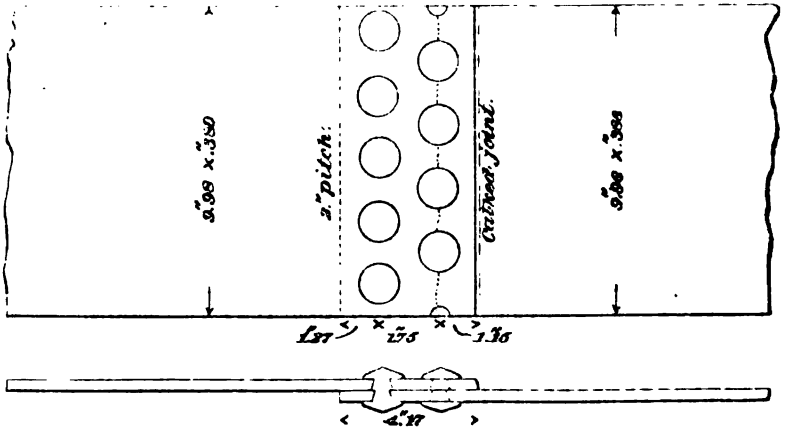
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0005		
20,000	.0020		
30,000	.0038		
35,000	.0048		
5,000		.0010	
40,000	.0068		
45,000	.0079		
50,000	.0095		
55,000	.0120		
60,000	.0145		
65,000	.0178		
70,000	.0210		Joint opened perceptibly.
75,000	.0258		Joint open ".01.
5,000		.0141	
80,000	.0300		
85,000	.0348		Joint open ".02.
90,000	.0410		Joint open ".03.
95,000	.0488		Joint open ".04.
100,000	.0630		
112,400			Ultimate strength. Fractured upper plate through row of five rivet holes.

Fractured plate shows imperfect welds in rolling.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	28,530
Tensile strain on net section of plate	46,255
Compressive strain on bearing surface of rivets	41,489
Shearing strain on rivets	27,550

No. 71.—⅜" Iron Plate. Joint G.



11/16" iron rivets, "Burden's best."
Punched holes: Punch, ".753 diameter; die, ".774 diameter.

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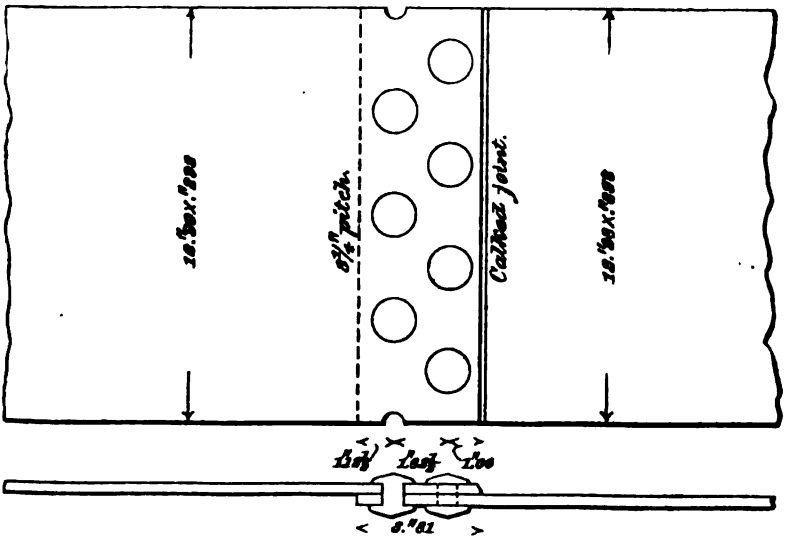
	Square inches.
Gross sectional area of under plate	3.87
Net sectional area of under plate	2.39
Bearing surface of rivets	2.67
Shearing area of rivets (".76 diameter)	4.08

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0005		
20,000	.0020		
30,000	.0040		
35,000	.0050		
5,000		.0005	
40,000	.0065		
45,000	.0080		
50,000	.0105		
55,000	.0130		
60,000	.0160		Joint opened perceptibly.
65,000	.0198		Joint open ".01.
70,000	.0240		Joint open ".02.
75,000	.0290		Joint open ".03.
80,000	.0348		Joint open ".04.
85,000	.0399		
90,000	.0468		
95,000	.0555		
100,000	.0680		
110,200			Ultimate strength. Fractured the under plate through line of four rivet holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	28,475
Tensile strain on net section of plate	46,110
Compressive strain on bearing surface of rivets	41,270
Shearing strain on rivets	27,010

No. 81.—$\frac{3}{8}$" Iron Plate. Joint I.



$\frac{11}{16}$" iron rivets, "Burden's best."
Drilled holes, ".75 diameter.

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	Square inches.
Gross sectional area of upper plate	5.09
Net sectional area of upper plate	3.91
Bearing surface of rivets	2.06
Shearing area of rivets (".75 diameter)	3.09

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	0.		
20,000	.0002		
30,000	.0009		
40,000	.0020		
50,000	.0050		
55,000	.0070		
60,000	.0098		
65,000	.0120		
5,000		.0050	
70,000	.0150		
75,000	.0190		
80,000	.0250		
85,000	.0362		Joint opened perceptibly.
90,000	.0458		Joint open ".01+
95,000	.0580		Joint open ".03.
100,000	.0708		Joint open ".06.
105,000	.0860		
110,000	.1080		
115,000	.1350		
120,900			Ultimate strength. Sheared rivets.

Average elongation of holes, ".04.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	23,750
Tensile strain on net section of plate	30,920
Compressive strain on bearing surface of rivets	58,700
Shearing strain on rivets	39,130

No. 82.—⅜" Iron Plate. Joint I.

Same style of joint as No. 81.
Upper plate, 12".97 × ".395.
Under plate, 12".97 × ".395.
$\frac{11}{16}$" iron rivets, "Burden's best."
Drilled holes, ".75 diameter.

	Square inches.
Gross sectional area of plate	5.12
Net sectional area of plate	3.94
Bearing surface of rivets	2.07
Shearing area of rivets (".75 diameter)	3.09

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Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0002		
20,000	.0012		
30,000	.0028		
40,000	.0050		
50,000	.0120		
55,000	.0140		
60,000	.0170		
65,000	.0210		
5,000		.0145	
70,000	.0255		
75,000	.0300		
80,000	.0400		Joint opened ".01.
85,000	.0510		
90,000	.0608		Joint opened ".02.
95,000	.0750		Joint opened ".04.
100,000	.0890		Joint opened ".06.
105,000	.1080		
118,700			Ultimate strength. Sheared rivets.

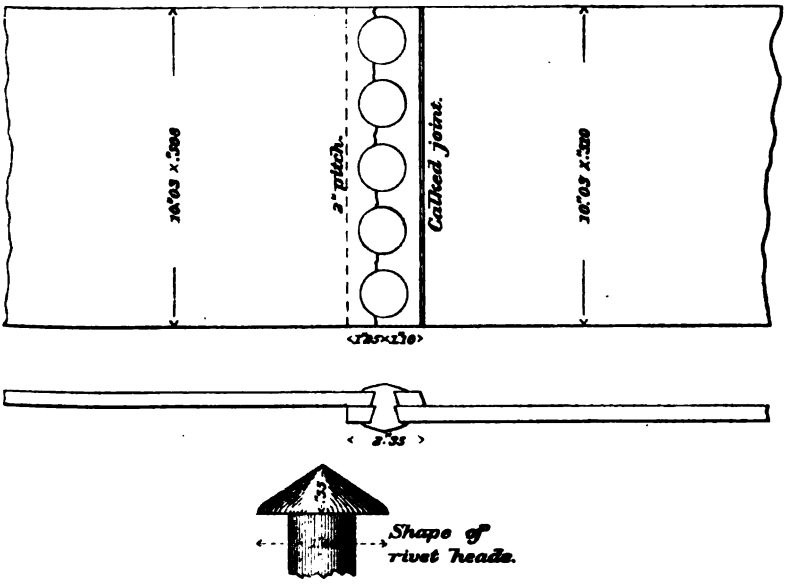
Average elongation of rivet holes, ".06.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	23,180
Tensile strain on net section of plate	30,130
Compressive strain on bearing surface of rivets	57,340
Shearing strain on rivets	38,410

SINGLE AND DOUBLE RIVETED LAP JOINTS, ¼" IRON PLATE.

No. 240.—½" Iron Plate. Joint A.



⅞" iron rivets, "Burden's best."
Punched holes: Punch, $1\frac{3}{16}$" diameter; die, $1\frac{1}{16}$" diameter.

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	Square inches.
Gross sectional area of upper plate	5.095
Net sectional area of upper plate	2.91
Bearing surface of rivets	2.18
Shearing area of rivets (".82 diameter)	2.64

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0008		
20,000	.0020		
30,000	.0042		
35,000	.0068		
5,000		.0025	
40,000	.0108		
45,000	.0148		Joint opened perceptibly.
50,000	.0172		
5,000		.0085	
55,000	.0199		
60,000	.0230		
65,000	.0298		Joint open ".01.
70,000	.0418		Joint open ".01½.
5,000		.0265	
10,000	.0280		
20,000	.0308		
30,000	.0330		
40,000	.0358		
50,000	.0380		
5,000		.0268	
10,000	.0280		
20,000	.0308		
30,000	.0330		
40,000	.0358		
50,000	.0380		
70,000	.0428		
75,000	.0548		
80,000	.0718		
5,000		.0540	
10,000	.0560		
20,000	.0588		
30,000	.0610		
40,000	.0638		
50,000	.0658		Micrometer removed.
85,000	.10		Joint open ".04.
90,000	.15		
90,500			Ultimate strength.

Fractured top plate, the line of the fracture following about ".08 back of center line of rivet holes.

The plate that fractured had the die side in contact with lower plate.

Metal fibrous, except around the punched holes, which was granular; on the punch side of the plate little or no granulation was found, but on the die side the ring of granular metal reached the maximum amount of $\frac{1}{10}$" thickness.

Along the calked edge granular metal was found. At 50,000 pounds tension snapping sounds were heard, which were repeated occasionally till fracture took place. These sounds were attributed to the supposed giving way of the granular metal about the rivet holes, from time to time, as the plates bent at the joint.

Fractures were started about the holes in the under plate.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	17,760
Tensile strain on net section of plate	31,100
Compressive strain on bearing surface of rivets	41,500
Shearing strain on rivets	34,280

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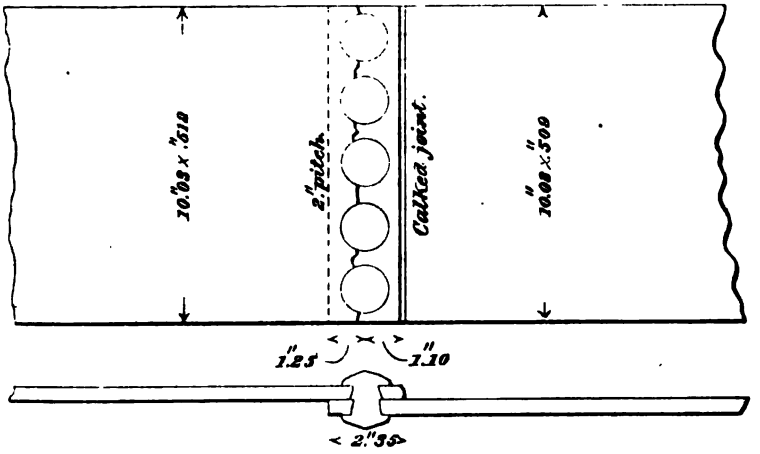
No. 241.—½″ Iron Plate. Joint A . .



¾″ iron rivets, "Burden's best."
Punched holes: Punch, $\frac{1}{16}$″ diameter; die, $\frac{3}{32}$″ diameter.

	Square inches.
Gross sectional area of upper plate	5.14
Net sectional area of upper plate	2.94
Bearing surface of rivets	2.20
Shearing area of rivets (".82 diameter)	2.64

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0005		
20,000	.0020		
30,000	.0038		
35,000	.0052		
5,000		.0019	
10,000	.0021		
20,000	.0035		
30,000	.0049		
35,000	.0055		
5,000		.0019	
10,000	.0022		
20,000	.0038		
30,000	.0049		
35,000	.0058		
40,000	.0065		
45,000	.0121		
50,000	.0155		
5,000		.0080	
10,000	.0085		
20,000	.0100		
30,000	.0112		
40,000	.0132		
50,000	.0160		
55,000	.0190		
60,000	.0221		
65,000	.0268		Joint opened perceptibly.
70,000	.0370		Joint opened ".01.
75,000	.0500		Micrometer removed.
80,000	.07		
85,000	.09		
90,000	.13		
92,300			Ultimate strength. Fractured upper plate.
70,000			Load at time of fracture.

Fractured in the same manner as A . Same description of appearance of fractures.

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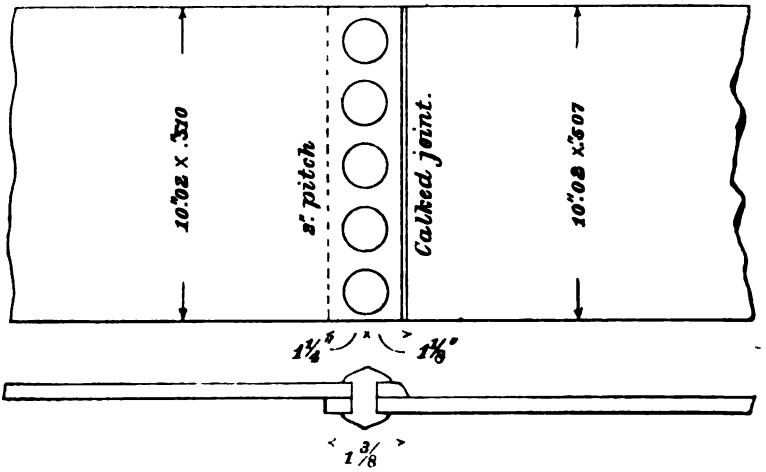
Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	17,690
Tensile strain on net section of plate	31,395
Compressive strain on bearing surface of rivets	41,955
Shearing strain on rivets	34,960

No. 292.—½″ Iron Plate. Joint A A.



⅜″ iron rivets, "Burden's best."
Drilled holes, ".81 diameter.

	Square inches.
Gross sectional area of lower plate	5.08
Net sectional area of lower plate	3.03
Bearing surface of rivets	2.05
Shearing area of rivets (".81 diameter)	2.58

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0002		
20,000	.0008		
30,000	.0022		
35,000	.0032		
5,000		.0006	
40,000	.0065		
45,000	.0108		
50,000	.0148		Joint opened perceptibly.
5,000		.0065	
55,000	.0190		
60,000	.0222		
65,000	.0280		Joint opened ".01.
70,000	.0405		
75,000	.0570		Joint open ".02.
80,000	.0760		
85,000	.10		Joint open ".05.
90,000	.13		
95,000	.16		
98,100	.19		Ultimate strength. Sheared rivets.

Average elongation of rivet holes, ".09.

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Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of under plate	19,130
Tensile strain on net section of under plate	32,376
Compressive strain on bearing surface of rivets	47,850
Shearing strain on rivets	38,020

No. 293.—½″ Iron Plate. Joint A A . .

Same style of joint as No. 292.
Upper plate, 10″.03 × ″.510.
Under plate, 10″.03 × ″.510.
¾″ iron rivets, "Burden's best."
Drilled holes, ″.81 diameter.

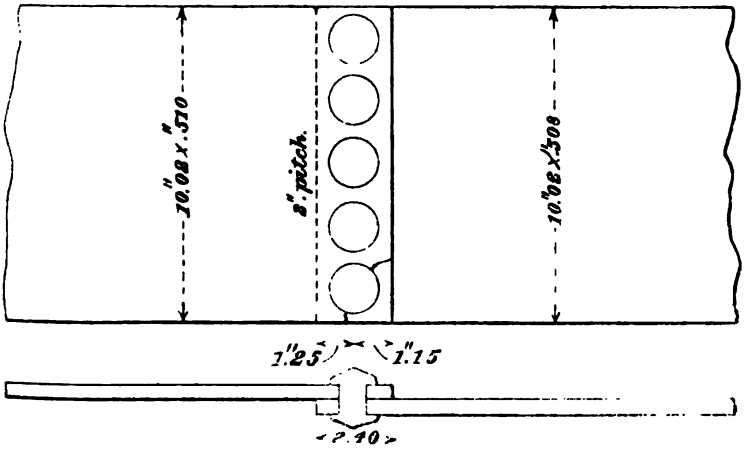
	Square inches.
Gross sectional area of plate	5.12
Net sectional area of plate	3.05
Bearing surface of rivets	2.07
Shearing area of rivets	2.58

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0006		
20,000	.0019		
25,000	.0028		
30,000	.0038		
35,000	.0060		
5,000		.0022	
40,000	.0092		
45,000	.0130		
50,000	.0175		
60,000	.0275		
70,000	.0490		
80,000	.0860		
90,000	.15		
100,000	.23		
101,200	.24		Ultimate strength. Sheared rivets.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	19,765
Tensile strain on net section of plate	33,180
Compressive strain on bearing surface of rivets	48,890
Shearing strain on rivets	39,220

No. 327.—½″ Wrought-iron Plate. Joint A A A



¾″ steel rivets; $\frac{13}{16}$″ drilled holes.

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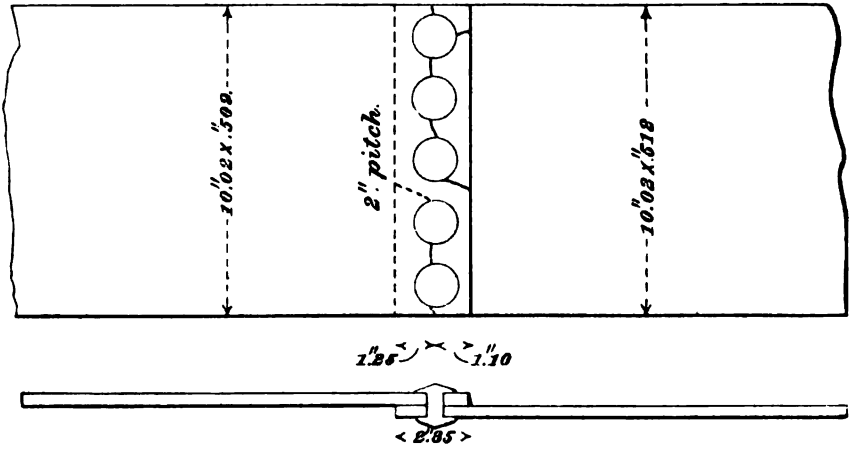
	Square inches.
Gross sectional area of upper plate	5.11
Net sectional area of upper plate	3.04
Bearing surface of rivets	2.06
Shearing area of rivets (".81 diameter)	2.58

Ultimate strength, 121,300 pounds.
Sheared four rivets and tore out upper plate at one end rivet.
Fractures started at rivet holes in upper plate.
Average elongation of rivet holes in upper plate, ".15.
Average elongation of rivet holes in lower plate, ".14.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	23,740
Tensile strain on net section of upper plate	39,900
Compressive strain on bearing surface of rivets	58,880
Shearing strain on rivets	47,020

No. 328.—½" Wrought Iron. Joint A A A . .



¾" steel rivets; $\frac{13}{16}$" drilled holes.

	Square inches.
Gross sectional area of upper plate	5.10
Net sectional area of upper plate	3.04
Bearing surface of rivets	2.06
Shearing area of rivets	2.58

Ultimate strength, 123,400 pounds.
Fractured plates opposite three rivets in upper plate and opposite two rivets in under plate.
Seam in upper plate 4" wide.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	24,200
Tensile strain on net section of upper plate	40,590
Compressive strain on bearing surface of rivets	59,900
Shearing strain on rivets	47,830

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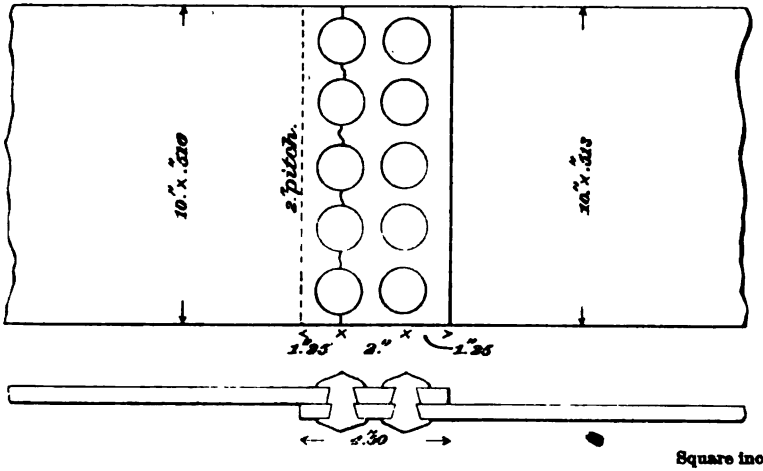
No. 329.—½″ Wrought-iron Plate. Joint C



	Square inches.
Gross sectional area of upper plate	5.16
Net sectional area of upper plate	2.96
Bearing surface of rivets	2.20
Shearing area of rivets	5.19

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0008		
20,000	.0015		
30,000	.0033		
35,000	.0042		
5,000		.0005	
40,000	.0055		
50,000	.0080		
5,000		.0018	
55,000	.0099		
60,000	.0116		
65,000	.0142		
70,000	.0170		
75,000	.0212		
80,000	.0250		
85,000	.0300		
90,000	.0348		
95,000	.0400		
100,000	.0470		
5,000		.0338	
131,200			Ultimate strength.

Fractured upper plate across line of rivet holes.

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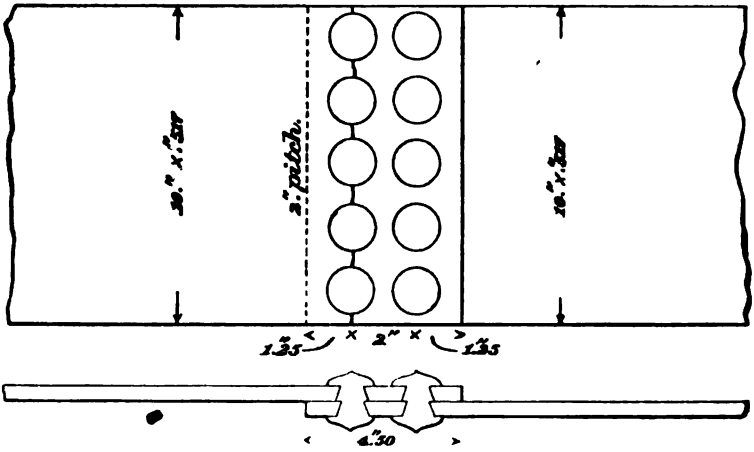
No. 635.—½″ Iron Plate. Joint C . .



¾″ iron rivets, "Burden's best."
Punched holes: Punch, 1 3/16″ diameter; die, 15/64″ diameter.

	Square inches.
Gross sectional area of plate	5.17
Net sectional area of plate	2.97
Bearing surface of rivets	2.20
Shearing area of rivets	5.19

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0009		
20,000	.0015		
30,000	.0032		
35,000	.0045		
5,000		.0005	
40,000	.0055		
50,000	.0081		
5,000		.0020	
55,000	.0100		
60,000	.0120		
65,000	.0141		
70,000	.0175		
75,000	.0220		
80,000	.0260		
85,000	.0312		
90,000	.0370		
95,000	.0435		
100,000	.0518		
5,000		.0398	
127,480			Ultimate strength.
115,000			At time of fracture.

Fractured upper plate across line of rivet holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	24,660
Tensile strain on net section of plate	42,920
Compressive strain on bearing surface of rivets	57,950
Shearing strain on rivets	24,560

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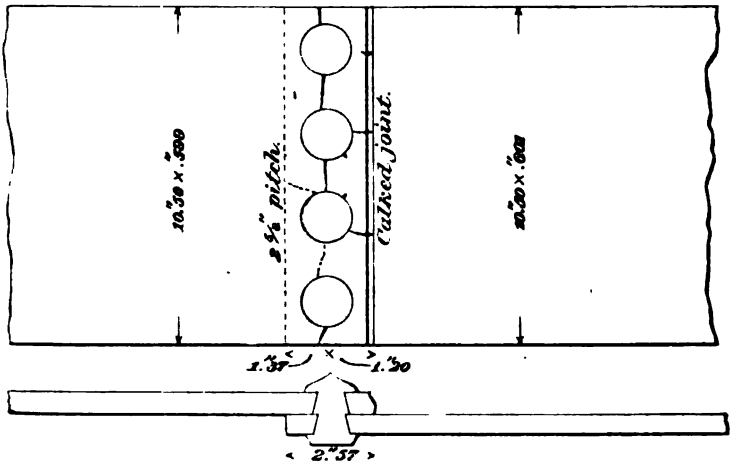
SINGLE AND DOUBLE RIVETED LAP JOINTS, ⅜″ IRON PLATE.

No. 730.—⅜″ Iron Plate. Set A.



1″ iron rivets, hand-driven.
Punched holes: Punch, $1\frac{1}{16}$″ diameter; die, $1\frac{5}{32}$″ diameter.

	Square inches.
Gross sectional area of upper plate	6.29
Net sectional area of upper plate	3.63
Bearing surface of rivets	2.65
Shearing area of rivets	3.55

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0001		
20,000	.0009		
30,000	.0021		
40,000	.0038		
50,000	.0065		
55,000	.0080		
60,000	.0120		
65,000	.0148		
70,000	.0180		
75,000	.0240		
80,000	.0540		
90,000	.09		
95,000			Snapping sound heard.
100,000	.13		
110,000	.19		
120,000	.27		
125,900			Ultimate strength.

Fractured upper plate across three rivet holes; lower plate fractured across two rivet holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	20,020
Tensile strain on net section of upper plate	34,680
Compressive strain on bearing surface of rivets	47,510
Shearing strain on rivets	35,460

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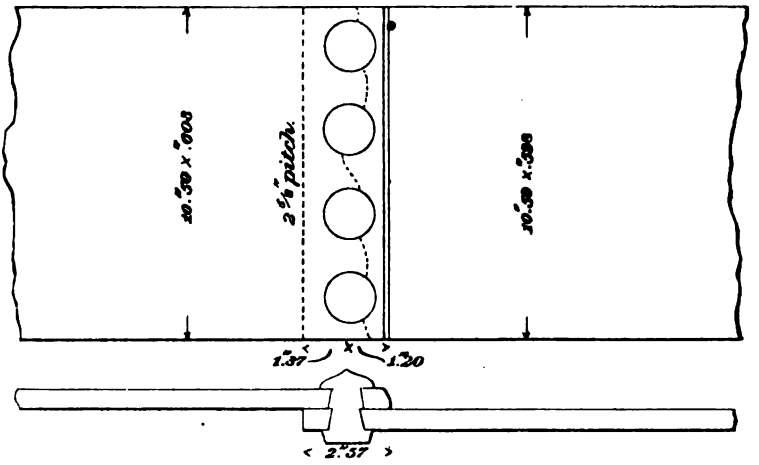
No. 731.—5/8" IRON PLATE. SET A . .



1" iron rivets, hand-driven.
Punched holes: Punch, $1\frac{1}{16}$" diameter; die, $1\frac{3}{32}$" diameter.

	Square inches.
Gross sectional area of under plate	6.28
Net sectional area of under plate	3.62
Bearing surface of rivets	2.65
Shearing area of rivets	3.55

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.	.....	
10,000	.0002	.....	
20,000	.0010	.....	
30,000	.0021	.....	
40,000	.0040	.....	
45,000	.0055	.....	
50,000	.0078	.....	
55,000	.0105	.....	
60,000	.0140	.....	
65,000	.0180	.....	
70,000	.0250	.....	
75,000	.0520	.....	
80,000	.0708	.....	
90,000	.09	.....	
100,000	.15	.....	
110,000	.22	.....	
120,000	.29	.....	
124,000	.....	.....	Ultimate strength.

Fractured under plate across line of rivet holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of under plate	19,750
Tensile strain on net section of under plate	34,230
Compressive strain on bearing surface of rivets	46,790
Shearing strain on rivets	34,930

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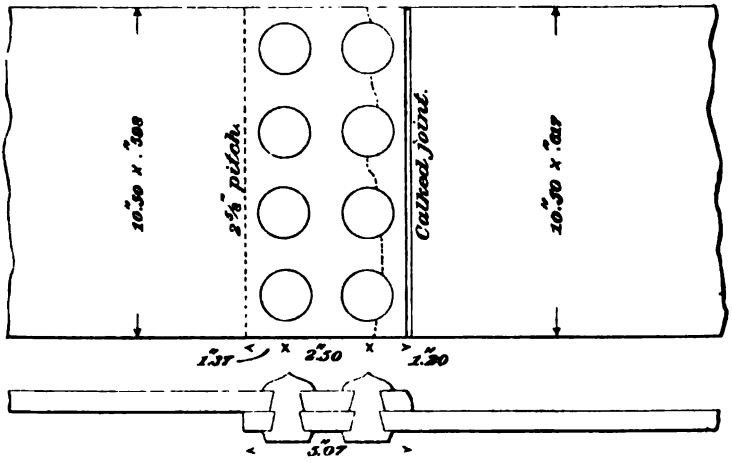
No. 732.—$\frac{5}{8}$″ Iron Plate. Set C.



1″ iron rivets, hand-driven.
Punched holes: Punch, $1\frac{1}{16}$″ diameter; die, $1\frac{5}{32}$″ diameter.

	Square inches.
Gross sectional area of under plate	6.48
Net sectional area of under plate	3.74
Bearing surface of rivets	5.48
Shearing area of rivets	7.09

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0002		
20,000	.0011		
30,000	.0025		
40,000	.0040		
50,000	.0060		
55,000	.0072		
60,000	.0091		
65,000	.0112		
70,000	.0135		
75,000	.0160		
80,000	.0190		
85,000	.0220		
90,000	.0251		
95,000	.0290		
100,000	.0320		
105,000	.0361		
110,000	.0405		
120,000	.08		
140,000	.10		
150,000	.14		
160 000	.17		
163,000			Ultimate strength.

Fractured under plate across line of rivet holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of under plate	25,150
Tensile strain on net section of under plate	43,580
Compressive strain on bearing surface of rivets	29,740
Shearing strain on rivets	22,990

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No. 733.—⅝″ Iron Plate. Set C . .

Same style of joint as No. 732.
Upper plate, 10″.50 × ″.613.
Under plate, 10″.50 × ″.604.
1″ iron rivets, hand-driven.
Punched holes: Punch, $1\frac{1}{16}$″ diameter; die, $1\frac{5}{32}$″ diameter.

	Square inches.
Gross sectional area of under plate	6.34
Net sectional area of under plate	3.66
Bearing surface of rivets	5.36
Shearing area of rivets	7.09

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0006		
20,000	.0018		
30,000	.0030		
40,000	.0048		
50,000	.0075		
55,000	.0093		
60,000	.0113		
65,000	.0140		
70,000	.0168		
80,000	.0225		
90,000	.0296		
100,000	.0375		
110,000	.0470		
120,000	.06		
130,000	.07		
140,000	.08		
150,000	.10		
160,000	.14		
167,800			Ultimate strength.

Fractured under plate across line of rivet holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of under plate	26,470
Tensile strain on net section of under plate	45,850
Compressive strain on bearing surface of rivets	31,310
Shearing strain on rivets	23,670

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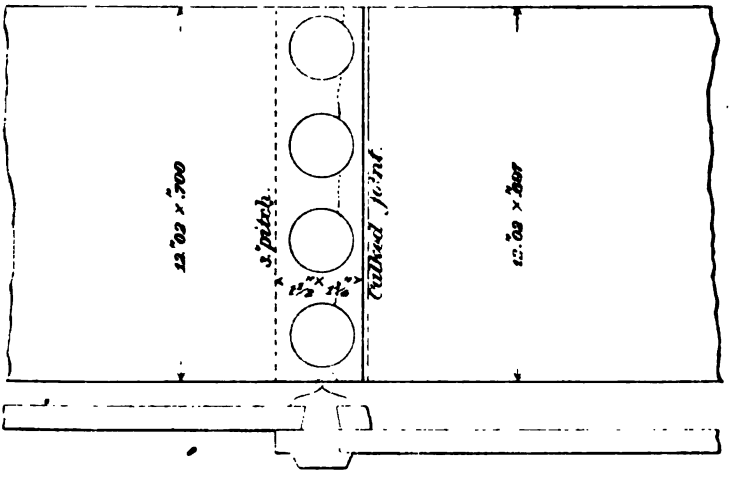
SINGLE AND DOUBLE RIVETED LAP JOINTS, ¼" IRON PLATE.

No. 722.—¾" Iron Plate. Set A.



1⅛" iron rivets, hand-driven.
Punched holes: Punch, 1 3/16" diameter; die, 1 3/16" diameter.

	Square inches.
Gross sectional area of under plate	8.38
Net sectional area of under plate	4.93
Bearing surface of rivets	3.44
Shearing area of rivets	4.43

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0002		
20,000	.0010		
30,000	.0020		
40,000	.0032		
50,000	.0065		
55,000	.0088		
60,000	.0111		
65,000	.0141		
70,000	.0168		
75,000	.0195		
80,000	.0230		
85,000	.0400		Joint opened perceptibly.
90,000	.0480		
100,000	.07		
110,000	.10		Joint open ".03.
120,000	.14		
130,000	.19		
140,000	.29		
144,400			Ultimate strength.

Fractured the under plate across line of rivet holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of under plate	17,230
Tensile strain on net section of under plate	29,290
Compressive strain on bearing surface of rivets	41,960
Shearing strain on rivets	32,600

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No. 723.—$\frac{3}{4}$″ IRON PLATE. SET A . .

Duplicate of A . No. 722.
Upper plate, 12″.02 × ″.699.
Under plate, 12″.02 × ″.697.
$1\frac{1}{8}$″ iron rivets, hand-driven.
Punched holes: Punch, $1\frac{3}{16}$″ diameter; die, $1\frac{9}{32}$″ diameter.

	Square inches.
Gross sectional area of under plate	8.38
Net sectional area of under plate	4.93
Bearing surface of rivets	3.44
Shearing area of rivets	4.48

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0002		
20,000	.0008		
30,000	.0012		
40,000	.0021		
45,000	.0028		
50,000	.0041		
55,000	.0061		
60,000	.0085		
65,000	.0120		
70,000	.0148		
75,000	.0183		
80,000	.0210		
85,000	.0271		
90,000	.0370		
95,000	.0500		
100,000	.062		
110,000	.07		
120,000	.08		
125,000			Sharp sound heard.
130,000	.16		
140,000	.21		
150,000	.33		
151,500			Ultimate strength.

Fractured the under plate across line of rivet holes.

Snapping sounds heard at intervals after load on joint reached 125,000 pounds.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of under plate	18,080
Tensile strain on net section of under plate	30,730
Compressive strain on bearing surface of rivets	44,040
Shearing strain on rivets	34,200

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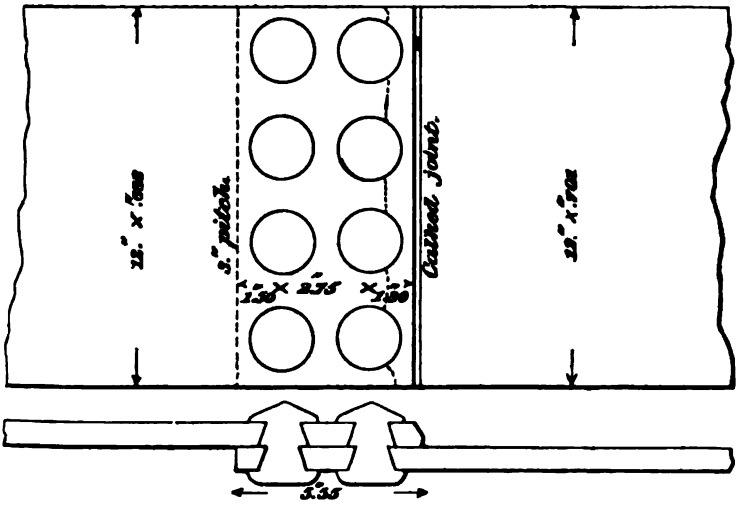
No. 724.—$\frac{3}{4}$″ Iron Plate. Set C.



$1\frac{1}{8}$″ iron rivets, hand-driven.
Punched holes: Punch, $1\frac{3}{16}$″ diameter; die, $1\frac{9}{32}$″ diameter.

	Square inches.
Gross sectional area of under plate	8.41
Net sectional area of under plate	4.95
Bearing surface of rivets	6.92
Shearing area of rivets	8.86

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0002		
20,000	.0009		
30,000	.0018		
40,000	.0030		
50,000	.0045		
60,000	.0068		
70,000	.0098		
80,000	.0145		
85,000	.0160		
90,000	.0190		
95,000	.0230		
100,000	.0255		Sharp snapping sounds heard.
105,000	.0289		
110,000	.0320		
120,000	.03+		Joint open ".02.
130,000	.04		
140,000	.05		
150,000	.06		
162,000	.07		
170,000	.10		
180,000	.13		
200,000	.22		
207,900			Ultimate strength.

Fractured under plate across line of rivet holes.
After test upper plate found bent to an angle of 10°.

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Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of under plate	24,720
Tensile strain on net section of under plate	42,000
Compressive strain on bearing surface of rivets	30,040
Shearing strain on rivets	23,460

No. 725.—$\frac{3}{4}$″ Iron Plate. Set C . .

Duplicate of C . No. 724.
Upper plate, 12″×″.393.
Under plate, 12″×″.681.
$1\frac{1}{8}$″ iron rivets, hand-driven.
Punched holes: Punch, ″$1\frac{5}{16}$ diameter; die, ″$1\frac{9}{32}$ diameter.

	Square inches.
Gross sectional area of under plate	8.17
Net sectional area of under plate	4.81
Bearing surface of rivets	6.72
Shearing area of rivets	8.86

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0001		
20,000	.0008		
30,000	.0012		
40,000	.0020		
50,000	.0030		
60,000	.0050		
70,000	.0068		
80,000	.0092		
90,000	.0135		
95,000	.0160		
100,000	.0185		
105,000	.0210		
110,000	.0240		
120,000	.0308		Snapping sounds heard.
130,000	.0380		
140,000	.0465		
150,000	.0575		
160,000	.07		
170,000	.09		
180,000	.11		
190,000	.15		
200,000	.18		
210,000	.22		
211,400			Ultimate strength.

Fractured under plate across line of rivet holes.

Maximum loads on joint.

	Pounds per sq inch.
Tensile strain on gross section of under plate	25,870
Tensile strain on net section of under plate	43,950
Compressive strain on bearing surface of rivets	31,460
Shearing strain on rivets	23,860

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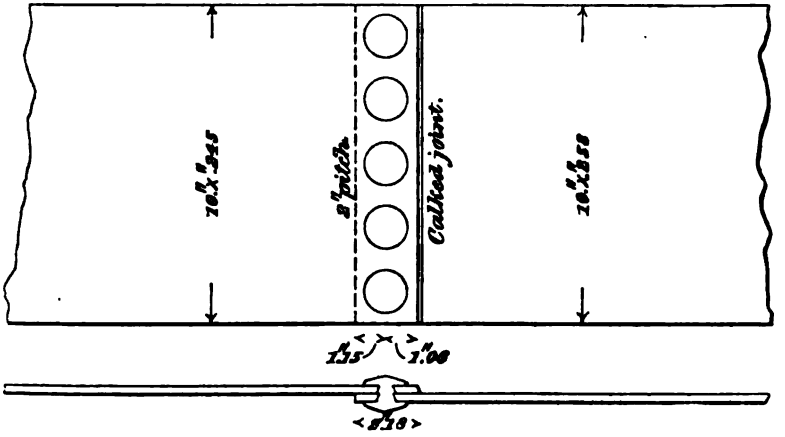
SINGLE-RIVETED LAP JOINTS, ¼″ STEEL PLATE.

No. 426.—¼″ STEEL PLATE. JOINT A.



⅝″ iron rivets, "Burden's best," machine-driven.
Punched holes: Punch, ".695 diameter; die, ".752 diameter.

	Square inches
Gross sectional area of upper plate	2.45
Net sectional area of upper plate	1.57
Bearing surface of rivets	.882
Shearing area of rivets (".70 diameter)	1.92

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
8,000	.0004		
10,000	.0011		
15,000	.0022		
20,000	.0035		
5,000		.0002	
25,000	.0051		
30,000	.0067		
35,000	.0090		
5,000		.0031	
38,000	.0108		
40,000	.0122		
42,000	.0136		
44,000	.0152		
46,000	.0171		
48,000	.0196		
50,000	.0234		Calking shows decided movement of plates; also plates slightly bent.
5,000		.0125	
52,000	.0310		Continued bending of plates.
54,000	.0365		Scale starts off upper plate along a line just touching rivet heads.
56,000	.0434		
58,000	.0491		
60,000	.0578		
5,000		.0432	
62,000	.0661		
64,000	.0758		Calking opened about ".06.
66,000	.0911		
68,000	.1102		
70,000	.1362		
72,000	.1790		
72,750	.2260		Ultimate strength.

Sheared the rivets; all rivets appeared to shear at same time. Fractured slightly two rivets under upper heads. Fractured all the rivets

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under the lower heads. No fractures started in the steel plates. Average elongation of holes in the plate, ".07.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	29,690
Tensile strain on net section of upper plate	46,340
Compressive strain on bearing surface of rivets	82,480
Shearing strain on rivets	37,890

No. 427.—¼" Steel Plate. Joint A . .

Same style of joint as No. 426.
Upper plate, 10" × ".247.
Under plate, 10" × ".247.
⅝" iron rivets, "Burden's best," machine-driven.
Punched holes: Punch, ".695 diameter; die, ".752 diameter.

	Square inches.
Gross sectional area of plate	2.47
Net sectional area of plate	1.58
Bearing surface of rivets	.889
Shearing area of rivets (".70 diameter)	1.92

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
8,000	0.		
10,000	0.		
15,000	.0001		
20,000	.0008		
5,000		.0009	
5,000	0.		New gangings began.
20,000	.0002		
25,000	.0010		
30,000	.0023		
35,000	.0040		
5,000		.0020	
38,000	.0052		
40,000	.0063		
42,000	.0075		
44,000	.0089		
46,000	.0099		
48,000	.0112		
50,000	.0159		
5,000		.0090	
52,000	.0210		
54,000	.0258		
56,000	.0312		
58,000	.0370		
60,000	.0452		
5,000		.0352	Calked joint opened about ".03.
62,000	.0540		Scale has started on two rivet heads.
64,000	.0620		
66,000	.0760		
68,000	.0890		
70,000	.1070		
72,700	.1660		Ultimate strength. Sheared rivets.

After the ultimate load was passed and the pressure running down gradually the rivets sheared not simultaneously, as appeared to be the case with A . , but one rivet snapped first, quickly followed by the second and third; the two remaining rivets sounded as one when they parted.

Maximum loads on joints.

	Pounds per sq. inch.
Tensile strain on gross section of plate	29,430
Tensile strain on net section of plate	46,910
Compressive strain on bearing surface of rivets	81,780
Shearing strain on rivets	37,860

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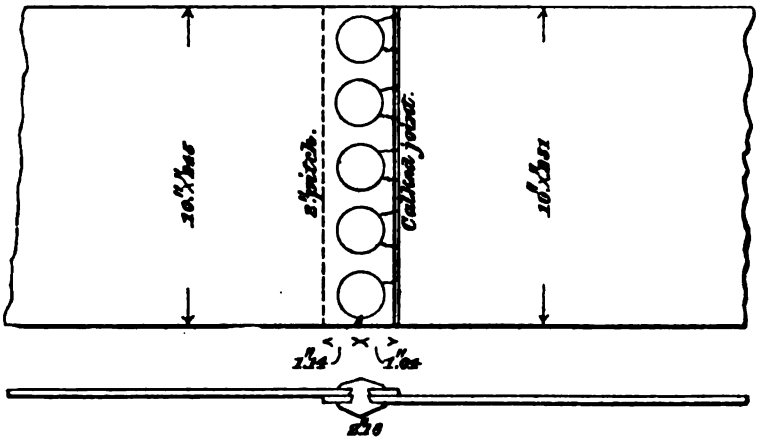
No. 436.—¼″ Steel Plate. Joint A A.



⅞″ steel rivets, machine driven.
Punched holes: Punch, ″.69 diameter; die, ″.75 diameter.

	Square inches.
Gross sectional area of plate	2.45
Net sectional area of plate	1.57
Bearing surface of rivets	.882
Shearing area of rivets (″.70 diameter)	1.92

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	.....	.....	The joint was not calked tight; slightly open at the commencement of the test.
10,000	.0007	.....	
15,000	.0017	.....	
20,000	.0031	.....	
25,000	.0044	.....	
30,000	.0057	.....	
35,000	.0082	.....	
5,000	.....	.0030	
38,000	.0106	.....	
40,000	.0118	.....	
42,000	.0130	.....	
44,000	.0142	.....	
46,000	.0158	.....	
48,000	.0171	.....	
50,000	.0187	.....	Slight change in calking of joint is perceptible.
5,000	.....	.0077	
52,000	.0207	.....	
54,000	.0227	.....	
56,000	.0263	.....	
58,000	.0300	.....	
60,000	.0332	.....	Joint opened about ″.03.
62,000	.0362	.....	
64,000	.0411	.....	
66,000	.0452	.....	Joint opened about ″.05.
68,000	.0521	.....	
70,000	.0614	.....	
72,000	.0690	.....	
74,000	.0792	.....	
76,000	.0882	.....	
78,000	.1070	.....	
80,000	.123	.....	
84,000	.....	.....	Ultimate strength.

Ultimate failure occurred by shearing the upper plate through the metal, as shown by the lines in the sketch. The first fracture which

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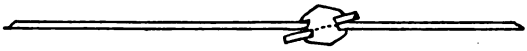
appeared in sight was at the end section at *A*. Holes in the under plate elongated about $\frac{3}{16}$" each.

Appearance of fractures: Silvery scale not disturbed on the body of the specimen.

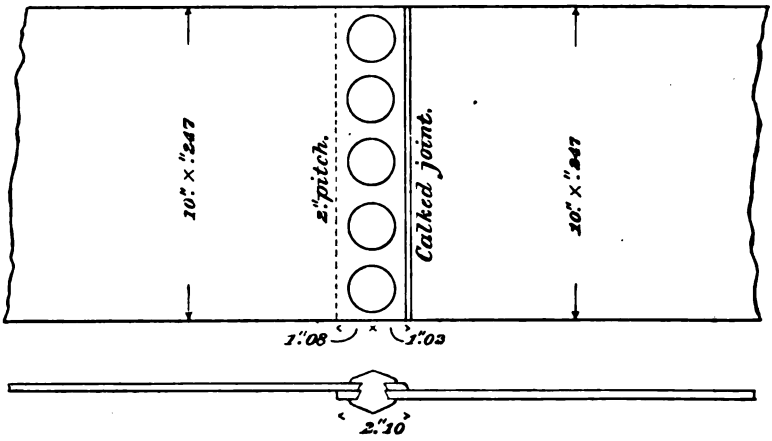
Lap ends of plate bent about 12°.

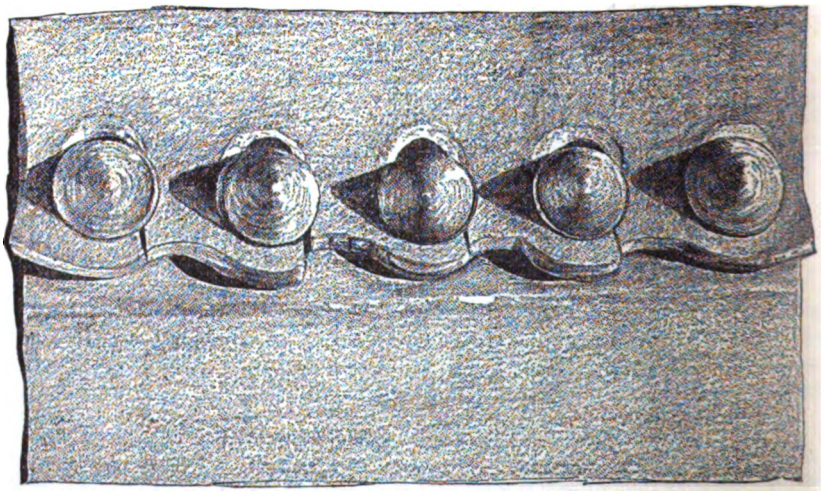


Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	38,610
Tensile strain on net section of plate	60,250
Compressive strain on bearing surface of rivets	107,260
Shearing strain on rivets	49,270

No. 437.—$\frac{1}{4}$" STEEL PLATE. JOINT A A . .





$\frac{5}{8}$" steel rivets.

Punched holes: Punch, ".69 diameter; die, ".75 diameter.

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	Square inches.
Gross sectional area of plate	2.47
Net sectional area of plate	1.58
Bearing surface of rivets	.889
Shearing area of rivets (".70 diameter)	1.92

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	.....	.....	
10,000	.0010	.....	
15,000	.0025	.....	
20,000	.0040	.....	
25,000	.0061	.....	
30,000	.0082	.....	
35,000	.0108	.....	
5,000	.....	.0035	
38,000	.0120	.....	Calking opened slightly in places.
40,000	.0130	.....	
42,000	.0140	.....	
44,000	.0150	.....	Joint opened ".01.
46,000	.0165	.....	
48,000	.0178	.....	
50,000	.0191	.....	Joint open about ".02.
52,000	.0211	.....	
54,000	.0235	.....	
56,000	.0260	.....	
58,000	.0295	.....	
60,000	.0329	.....	Joint open ".03.
62,000	.0360	.....	
64,000	.0402	.....	Scale started on rivet heads.
66,000	.0445	.....	
68,000	.0518	.....	Joint open ".04.
70,000	.0599	.....	
74,000	.0755	.....	
78,000	.0950	.....	
80,000	.1095	.....	
90,000	.2470	.....	
93,600	.3770	.....	Ultimate strength.

Joint failed similar to A A . by shearing plate, fractures beginning at the rivet holes.

Test discontinued before the fractures were all developed, the first fracture appearing at the second rivet from side of plate.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	37,895
Tensile strain on net section of plate	59,240
Compressive strain on bearing surface of rivets	105,290
Shearing strain on rivets	48,750

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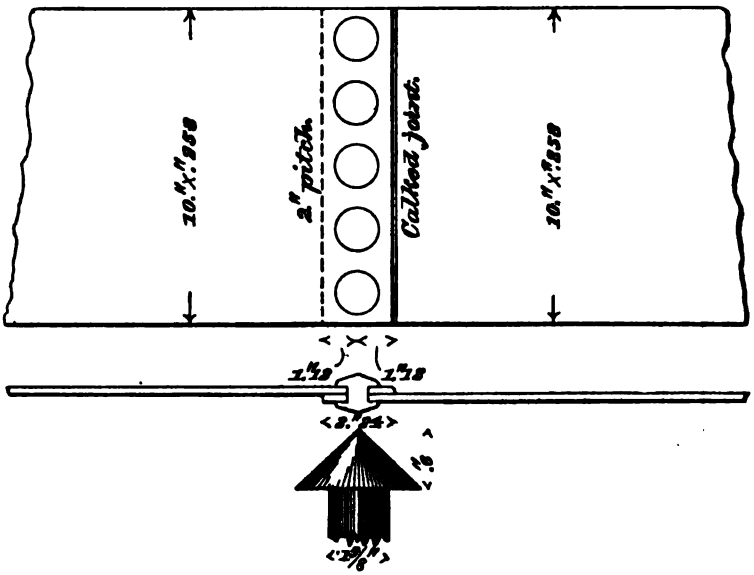
No. 428.—¼″ Steel Plate. Joint C.



⅝″ iron rivets, "Burden's best," machine-drawn.
Drilled holes, ".69 diameter.

	Square inches.
Gross sectional area of plate	2.53
Net sectional area of plate	1.66
Bearing surface of rivets	.873
Shearing area of rivets (".69 diameter)	1.87

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
8,000	.0006		
10,000	.0010		
15,000	.0020		
20,000	.0040		
5,000		.0006	
25,000	.0057		
30,000	.0089		
32,000	.0097		
34,000	.0103		
35,000	.0109		
5,000		.0031	
36,000	.0113		
38,000	.0122		
40,000	.0136		Scale started on two rivet heads; calking opened slightly.
42,000	.0149		
44,000	.0161		
46,000	.0179		
48,000	.0223		Calked joint opened about ".02.
50,000	.0299		
5,000		.0161	
52,000	.0361		
54,000	.0430		
56,000	.0520		
58,000	.0620		
60,000	.0730		
62,000	.0910		
64,000	.1070		
66,000	.1330		
67,980	.2090		Ultimate strength.

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Joint failed by shearing rivets and tearing off rivet heads.
Elongation of holes after fracture about ".07.

REMARKS.—The form of the rivet heads appears to be such as to develop weakness under the heads; the conical head being weak and easily bent at the edge, brings a strain tending to tear off the head, which is illustrated by the failure specimens A . A .. and C .

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	26,870
Tensile strain on net section of plate	40,950
Compressive strain on bearing surface of rivets	77,870
Shearing strain on rivets	36,350

No. 429.—¼" STEEL PLATE. JOINT C . .

Same style of joint as No. 428.
Upper plate, 10" × ".248.
Under plate, 10" × ".248.
⅝" iron rivets, "Burden's best," machine-drawn.
Drilled holes, ".69 diameter.

	Square inches.
Gross sectional area of plate	2.48
Net sectional area of plate	1.62
Bearing surface of rivets	.856
Shearing area of rivets (".69 diameter)	1.87

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	.....	.....	
8,000	.0008	.....	
10,000	.0015	.....	
15,000	.0027	.....	
20,000	.0045	.....	
5,000	.....	.0006	
25,000	.0062	.....	
30,000	.0087	.....	
35,000	.0116	.....	
5,000	.....	.0033	
38,000	.0136	.....	
40,000	.0155	.....	
42,000	.0172	.....	
44,000	.0195	.....	
46,000	.0227	.....	
48,000	.0276	.....	
50,000	.0327	.....	
52,000	.0390	.....	
54,000	.0450	.....	
56,000	.0530	.....	
58,000	.0620	.....	
60,000	.0720	.....	
63,650	.1860	.....	Ultimate strength.

Failed by shearing the rivets.
Fractures started under rivet heads.

Maximum loads on joint.

	Pounds per sq. inch
Tensile strain on gross section of plate	27,680
Tensile strain on net section of plate	42,370
Compressive strain on bearing surface of rivets	80,200
Shearing strain on rivets	36,710

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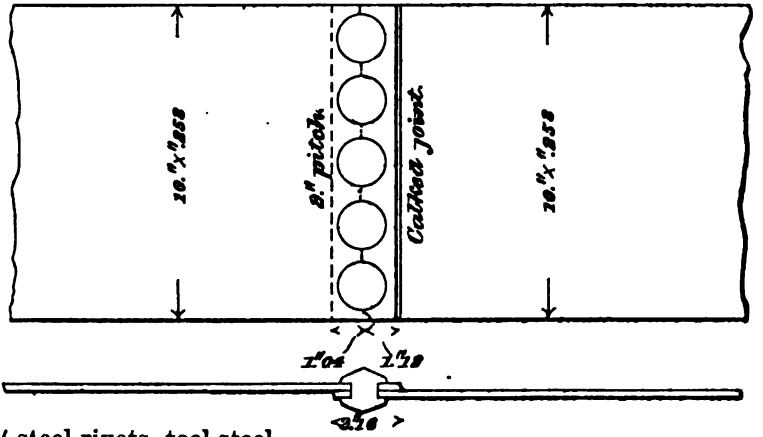
No. 438.—¼" STEEL PLATE. JOINT C C



⅝" steel rivets, tool-steel.
Drilled holes, ".69 diameter.

	Square inches.
Gross sectional area of plate	2.53
Net sectional area of plate	1.66
Bearing surface of rivets	.873
Shearing area of rivets (".69 diameter)	1.87

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	.....	.....	
10,000	.0010	.....	
15,000	.0020	.....	
20,000	.0035	.....	
25,000	.0049	.....	
30,000	.0068	.....	
35,000	.0091	.....	
5,000	.....	.0040	
38,000	.0110	.....	Perceptible opening of joint.
40,000	.0120	.....	
42,000	.0130	.....	
44,000	.0145	.....	
46,000	.0160	.....	
48,000	.0170	.....	Joint opened ".01
50,000	.0190	.....	
5,000	.....	.0098	
52,000	.0210	.....	
54,000	.0230	.....	
56,000	.0258	.....	
58,000	.0290	.....	Joint open ".02.
60,000	.0320	.....	
62,000	.0358	.....	Joint open ".03.
64,000	.0390	.....	
66,000	.0430	.....	Joint open ".04.
68,000	.0475	.....	
70,000	.0522	.....	
74,000	.0640	.....	Joint open ".05.
78,000	.0800	.....	
80,000	.0930	.....	Joint open ".06 to ".07.
90,000	.1910	.....	
96,000	.3270	.....	
104,900	.....	.....	Ultimate strength.

Tore under plate through line of rivets, fracture first making its appearance at second rivet hole. Before the ultimate strain was reached the under plate had stretched about the holes to such an extent that some of the holes were in sight beyond the rivet heads. After fracture the average elongation of holes in the fractured plate was ".55. Fracture silky and the metal well drawn down. One rivet was weakened by the shearing strain.

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Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	41,460
Tensile strain on net section of plate	63,190
Compressive strain on bearing section of rivets	120,160
Shearing strain on rivets	56,100

No. 439.—¼″ Steel Plate. Joint C . C .

Same style of joint as No. 438.
Upper plate, 10″ × ″.248.
Under plate, 10″ × ″.245.
⅝″ steel rivets, tool-steel.
Drilled holes, ″.69 diameter.

	Square inches.
Gross sectional area of plate	2.45
Net sectional area of plate	1.60
Bearing surface of rivets	.845
Shearing area of rivets (″.69 diameter)	1.87

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	.....	.....	
10,000	.0012	.....	
15,000	.0022	.....	
20,000	.0037	.....	
25,000	.0052	.....	
30,000	.0072	.....	
35,000	.0101	.....	
5,000	.....	.0032	
38,000	.0114	.....	
40,000	.0128	.....	
42,000	.0142	.....	Perceptible starting of the calked joint.
45,000	.0163	.....	
48,000	.0192	.....	
50,000	.0214	.....	Joint opened about ″.00½.
5,000	.....	.0103	Joint closes where strains are released.
52,000	.0242	.....	Joint open ″.01.
55,000	.0300	.....	
58,000	.0361	.....	
60,000	.0402	.....	
62,000	.0450	.....	
64,000	.0492	.....	
66,000	.0552	.....	Joint open ″.05.
68,000	.0622	.....	Joint open ″.06.
70,000	.0713	.....	
75,000	.1002	.....	
80,000	.1462	.....	
90,000	.3510	.....	
98,100	.....	.....	Ultimate strength.

Fractured through the under plate same as C C . Before the ultimate load was reached the holes in the under plate had elongated so as to appear beyond the rivet heads. After fracture, average elongation of holes in fractured plate ″.53; metal well drawn down. Total width of steel reduced about ″.06, the joint ends puckered, presenting wavy lines. The holes in the upper plate elongated about ″.28 each. Opposite one rivet the metal began to fracture from the end of the plate. When final fracture occurred the metal gave way, first at the inside sections. The rivets were weakened and indented about ″.04 by the shearing strain.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	40,040
Tensile strain on net section of plate	61,310
Compressive strain on bearing surface of rivets	116,090
Shearing strain on rivet	52,460

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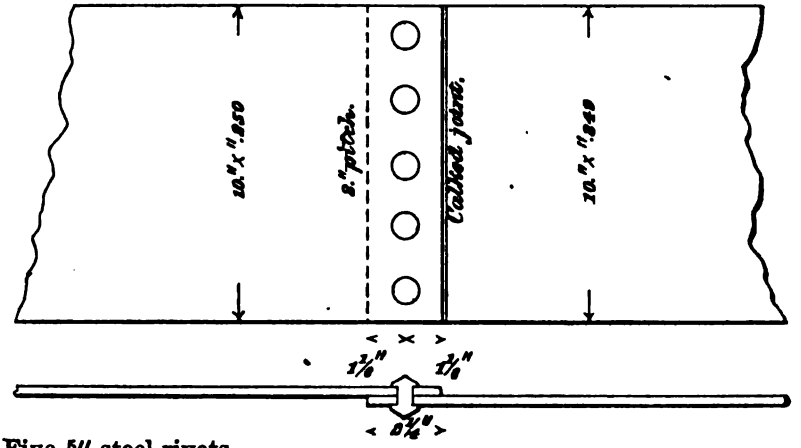
No. 49.—¼" Steel Plate. Joint C C C.



Five ⅞" steel rivets.
Drilled holes, ".69 diameter.

	Square inches.
Gross sectional area of under plate	2.49
Net sectional area of under plate	1.63
Bearing surface of rivets	8.56
Shearing area of rivets	1.57

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0005		
15,000	.0010		
20,000	.0020		
25,000	.0035		
30,000	.0050		
35,000	.0080		
5,000		.0035	
40,000	.0110		
45,000	.0143		
50,000	.0182		
52,000	.0198		
54,000	.0218		
56,000	.0245		
58,000	.0270		
60,000	.0306		
62,000	.0345		Joint started perceptibly.
64,000	.0465		Joint open ".01.
66,000	.0530		
68,000	.0585		Joint open ".03.
70,000	.0688		Joint open ".04.
72,000	.0768		
74,000	.0870		Joint open ".05.
76,000	.0960		
78,000	.1090		
80,000	.1218		
98,100			Ultimate strength. Sheared rivets.

Average elongation of holes, ".18.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	39,400
Tensile strain on net section of plate	60,184
Compressive strain on bearing surface of rivets	114,603
Shearing strain on rivets	52,742

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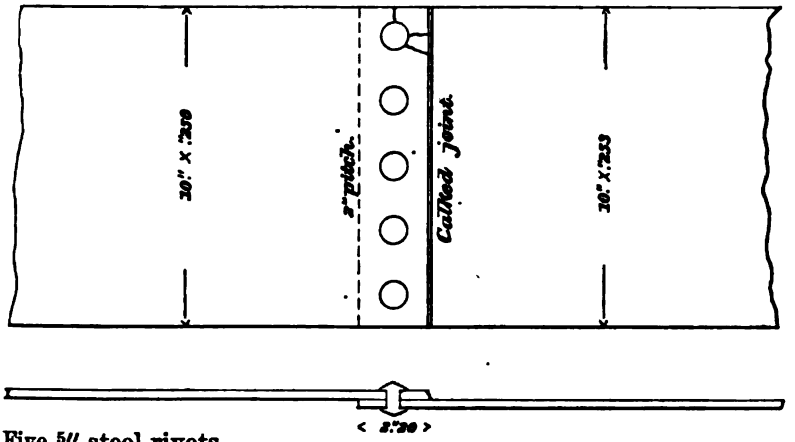
No. 50.—¼″ Steel Plate. Joint CCC . .



Five ⅝″ steel rivets.
Drilled holes, ″.69 diameter.

	Square inches.
Gross sectional area of upper plate	2.50
Net sectional area of upper plate	1.64
Bearing surface of rivets	.859
Shearing area of rivets	1.86

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0008		
20,000	.0030		
30,000	.0069		
35,000	.0090		
5,000		.0040	
40,000	.0125		
45,000	.0151		
50,000	.0188		
52,000	.0210		
54,000	.0235		Joint started perceptibly.
56,000	.0280		
58,000	.0350		Joint open ″.01.
60,000	.0395		
62,000	.0452		
64,000	.0508		Joint open ″.02.
66,000	.0568		
68,000	.0640		Joint open ″.03.
70,000	.0710		
72,000	.0790		Joint open ″.04.
74,000	.0880		
76,000	.0988		
78,000	.1112		Joint open ″.05.
80,000	.1275		
94,200			Ultimate strength. Sheared four rivets. Tore out plate at end rivet.

Elongation of inside holes, ″.12 each.
Elongation of end hole, ″.26.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	37,680
Tensile strain on net section of plate	57,439
Compressive strain on bearing surface of rivets	109,650
Shearing strain on rivets	50,645

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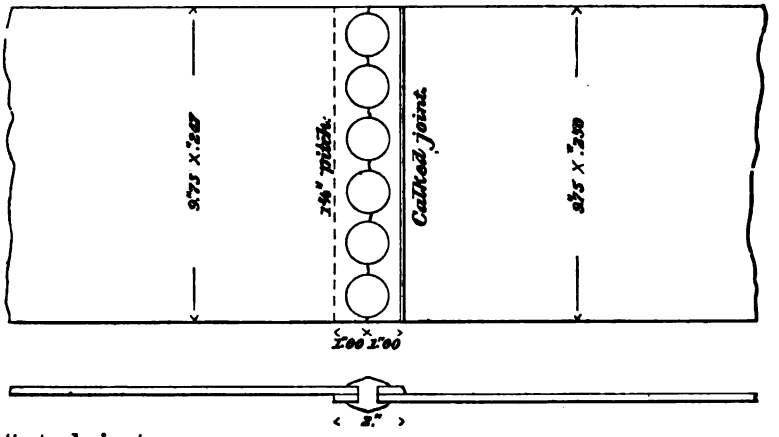
No. 430.—¼″ Steel Plate. Joint E.



⅝″ steel rivets.
Drilled holes, ″.69 diameter.

	Square inches.
Gross sectional area of plate	2.44
Net sectional area of plate	1.40
Bearing surface of rivets	1.04
Shearing area of rivets (″.69 diameter)	2.24

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	.....	.....	
8,000	.0007	.....	
10,000	.0013	.....	
15,000	.0030	.....	
20,000	.0045	.....	
5,000	.....	.0010	
25,000	.0064	.....	
30,000	.0085	.....	
35,000	.0110	.....	
5,000	.....	.0083	
40,000	.0135	.....	
42,000	.0147	.....	
44,000	.0160	.....	
46,000	.0173	.....	
48,000	.0187	.....	
50,000	.0205	.....	Calked joint slightly started.
52,000	.0228	.....	
54,000	.0245	.....	
56,000	.0265	.....	
58,000	.0295	.....	
60,000	.0321	.....	
5,000	.....	.0173	
10,000	.0012	.....	
15,000	.0022	.....	
20,000	.0037	.....	
25,000	.0052	.....	
30,000	.0067	.....	
35,000	.0067	.....	
40,000	.0082	.....	
50,000	.0110	.....	
60,000	.0142	.....	
62,000	.0332	.....	
64,000	.0364	.....	
66,000	.0395	.....	
68,000	.0431	.....	
70,000	.0460	.....	
72,000	.0500	.....	
74,000	.0540	.....	
76,000	.0595	.....	
78,000	.0681	.....	
80,000	.0745	.....	
82,000	.0833	.....	
84,000	.0947	.....	
93,600	.....	.....	Ultimate strength.

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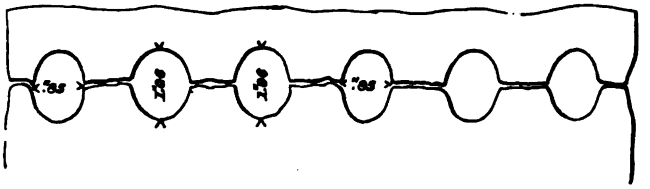
Failed by fracturing the under plate through rivet holes.
Silky fractures slightly lamellar, metal well drawn down.
Scale started on rivet heads; otherwise they appear undisturbed.
After the test the rivets were loose in the plate not fractured.
Fracture began at one edge and in first section between rivets.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of lower plate	38,360
Tensile strain on net section of lower plate	66,860
Compressive strain on bearing surface of rivets	90,000
Shearing strain on rivets	



Sketch, drawn one-third size, showing shape of rivet holes in fractured plate.

No. 431.—¼″ Steel Plate. Joint E . .

Same style of joint as No. 430.
Upper plate, 9″.75 × ″.250.
Under plate, 9.″75 × .″250.
⅝″ steel rivets.
Drilled holes, ″.69 diameter.

	Square inches.
Gross sectional area of plate	2.44
Net sectional area of plate	1.40
Bearing surface of rivets	1.04
Shearing area of rivets (″.69 diameter)	2.24

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	.....	.....	
10,000	.0004	.....	
15,000	.0010	.....	
20,000	.0018	.....	
25,000	.0031	.....	
30,000	.0045	.....	
35,000	.0065	.....	
5,000	.....	.0025	
40,000	.0091	.....	
42,000	.0103	.....	
44,000	.0114	.....	
46,000	.0130	.....	
48,000	.0145	.....	
50,000	.0164	.....	
52,000	.0183	.....	
54,000	.0205	.....	
56,000	.0233	.....	
58,000	.0256	.....	
60,000	.0285	.....	
5,000	.....	.0180	Calked joint slipped but not opened.
62,000	.0311	.....	
64,000	.0343	.....	
66,000	.0374	.....	
68,000	.0405	.....	
70,000	.0447	.....	
72,000	.0493	.....	Rivet heads scale off. Joint is about ″.03 open.
74,000	.0525	.....	
76,000	.0533	.....	
78,000	.0673	.....	
80,000	.0800	.....	
98,000	.....	.....	Ultimate strength.

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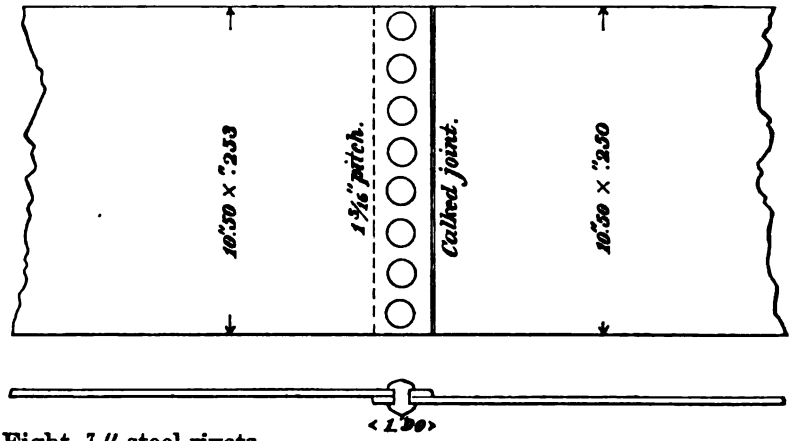
Fractured under plate through line of rivet holes same as E. The upper plate drew down in total width about ".10, causing the joint to pucker. Fine silky fractures, the metal well drawn down. Fracture began on one side, then reaching across the plate, beginning the fracture on the opposite side as it stood in the testing machine from the fracture of E.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	40,160
Tensile strain on net section of plate	70,000
Compressive strain on bearing surface of rivets	34,230
Shearing strain on rivets	

No. 47.—¼" Steel Plate. Joint H.



Eight $\frac{7}{16}$" steel rivets.
Drilled holes, ".50 diameter.

	Square inches.
Gross sectional area of upper plate	2.66
Net sectional area of upper plate	1.64
Bearing surface of rivets	1.01
Shearing area of rivets	1.572

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0008		
15,000	.0020		
20,000	.0028		
30,000	.0050		
35,000	.0070		
5,000		.0025	
40,000	.0095		
42,000	.0108		
44,000	.0120		
46,000	.0133		
48,000	.0150		
50,000	.0170		Scale starts on rivet heads.
5,000		.0075	
52,000	.0195		
54,000	.0220		
56,000	.0249		Joint started perceptibly.
58,000	.0270		
60,000	.0300		

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Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
62, 000	.0320	.....	Joint open ".01.
64, 000	.0350	.....	
66, 000	.0380	.....	
68, 000	.0420	.....	
70, 000	.0461	.....	
72, 000	.0500	.....	Joint open ".02.
74, 000	.0549	.....	
76, 000	.0590	.....	
78, 000	.0652	.....	Joint open ".03.
80, 000	.0695	.....	
82, 000	.0758	.....	
84, 000	.0830	.....	
86, 000	.0890	.....	
88, 000	.0972	.....	Joint open ".06.
90, 000	.1072	.....	
92, 000	.1250	.....	
96, 600	.....	.....	Rapid stretching of plate.
102, 400	.....	.....	Ultimate strength. Sheared rivets.

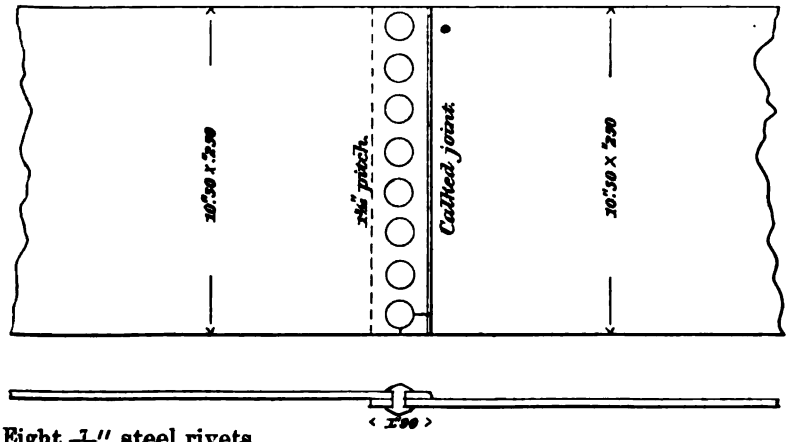
The inside of the upper plate showed very complete removal of scale. The outside of this plate the scale not removed partially. This behavior would naturally follow from the bending of the plate while under tensile stress, elongating the fibers on the convex side of the sheet more than the fibers on the concave side.

Average elongation of rivet holes, ".10.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	38, 496
Tensile strain on net section of upper plate	62, 440
Compressive strain on bearing surface of rivets	101, 180
Shearing strain on rivets	65, 220

No. 48.—¼" Steel Plate. Joint H . .



Eight $\frac{1}{16}$" steel rivets.
Drilled holes, ".50 diameter.

	Square inches.
Gross sectional area of plate	2. 625
Net sectional area of plate	1. 625
Bearing surface of rivets	1. 00
Shearing area of rivets	1. 57

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Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.	.....	
10,000	.0009	.....	
20,000	.0030	.....	
30,000	.0060	.....	
35,000	.0081	.....	
5,000	.....	.0023	
40,000	.0110	.....	
45,000	.0140	.....	
48,000	.0162	.....	
50,000	.0180	.....	
52,000	.0200	.....	Scale started on rivet heads. Joint started perceptibly.
54,000	.0228	.....	
56,000	.0248	.....	
58,000	.0272	.....	
60,000	.0300	.....	
62,000	.0320	.....	
64,000	.0350	.....	
66,000	.0378	.....	
68,000	.0400	.....	Joint open ".01.
70,000	.0440	.....	
72,000	.0478	.....	
74,000	.0521	.....	
76,000	.0565	.....	
78,000	.0610	.....	Joint open ".02.
80,000	.0670	.....	
82,000	.0722	.....	Joint open ".03.
84,000	.0790	.....	
86,000	.0860	.....	
88,000	.0935	.....	
90,000	.1040	.....	Joint open ".06.
94,800	.....	.....	Ultimate strength. Sheared seven rivets and tore out plate at end rivet.

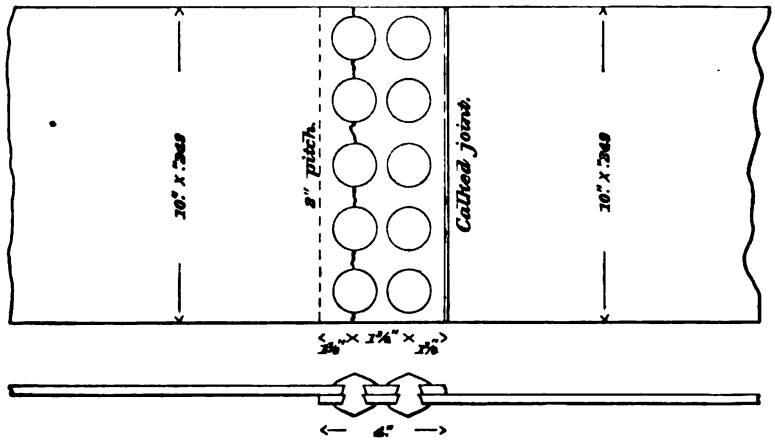
Average elongation of holes, ".07.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	36,114
Tensile strain on net section of plate	58,338
Compressive strain on bearing surface of rivets	94,880
Shearing strain on rivets	60,382

DOUBLE-RIVETED LAP JOINTS, ½" STEEL PLATE.

No. 432.—½" STEEL PLATE. JOINT F.



⅝" iron rivets, "Burden's best."
Punched holes: Punch, ".695 diameter; die, ".752 diameter.

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	Square inches.
Gross sectional area of plate	2.49
Net sectional area of plate	1.59
Bearing surface of rivets	1.79
Shearing area of rivets (".70 diameter)	3.85

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000			
10,000	.0012		
15,000	.0026		
20,000	.0041		
5,000		.0009	
25,000	.0055		
30,000	.0071		
35,000	.0089		
5,000		.0028	
40,000	.0110		
42,000	.0118		
44,000	.0125		
46,000	.0133		
48,000	.0142		
50,000			Calked joint opened about ".01.
52,000	.0161		
54,000	.0175		
56,000	.0182		
58,000	.0196		
60,000	.0210		
5,000		.0116	
62,000	.0229		
64,000	.0232		
66,000	.0250		Calked joint opened about ".03.
68,000	.0260		
70,000	.0280		
72,000	.0298		
74,000	.0316		
76,000	.0340		
78,000	.0369		
80,000	.0405		Joint opened about ".04 to ".05.
82,000	.0440		
84,000	.0500		
86,000	.0610		
97,800			Ultimate strength.

Fractured upper plate through line of rivet holes. Fractures began at the rivet holes weakening the whole plate at the same time, the bent and marked edge apparently not effecting the manner of fracture Fractures fine silky; metal well drawn down. The fractured plate had the die-side in.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	39,280
Tensile strain on net section of plate	61,510
Compressive strain on bearing surface of rivets	54,640
Shearing strain on rivets	25,400

No. 433.—¼″ Steel Plate. Joint F..

Same style of joint as No. 432.
Upper plate, 10″×".248.
Under plate, 10″×".254.
⅝″ iron rivets, "Burden's best."
Punched holes: Punch, ".695 diameter; die, ".752 diameter.

	Square inches.
Gross sectional area of plate	2.54
Net sectional area of plate	1.63
Bearing surface of rivets	1.83
Shearing area of rivets (".70 diameter)	3.85

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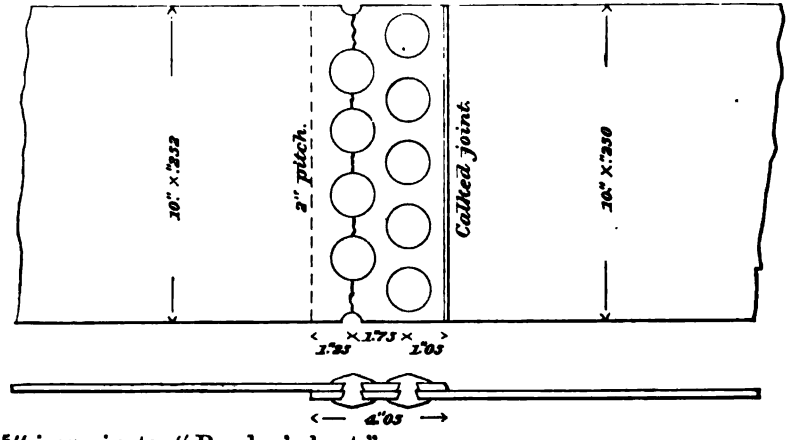
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	.....	.....	
10,000	.0013	.....	
15,000	.0026	.....	
20,000	.0038	.....	
5,000	.....	.0008	
25,000	.0048	.....	
30,000	.0063	.....	
35,000	.0079	.....	
5,000	.....	.0018	
40,000	.0098	.....	
42,000	.0100	.....	
44,000	.0108	.....	
46,000	.0118	.....	
48,000	.0126	.....	
50,000	.0131	.....	
52,000	.0138	.....	
56,000	.0158	.....	
58,000	.0168	.....	Calked joint opened about ".01.
60,000	.0179	.....	
5,000	.....	.0070	
62,000	.0193	.....	
64,000	.0207	.....	
66,000	.0218	.....	
68,000	.0238	.....	
70,000	.0257	.....	
72,000	.0268	.....	
74,000	.0290	.....	
76,000	.0318	.....	
78,000	.0343	.....	
80,000	.0374	.....	
82,000	.0408	.....	
84,000	.0456	.....	
86,000	.0517	.....	
88,000	.0630	.....	
90,000	.0750	.....	
98,300	.....	.....	Ultimate strength.

Fractured lower plate across line of rivet holes; appearance of fracture, silky; metal well drawn down.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	38,700
Tensile strain on net section of plate	60,300
Compressive strain on bearing surface of rivets	53,715
Shearing strain on rivets	25,530

No. 434.—¼" Steel Plate. Joint G.



⅝" iron rivets, "Burden's best."
Punched holes: Punch, ".695 diameter; die, .752 diameter.

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	Square inches.
Gross sectional area of plate	2.55
Net sectional area of plate	1.61
Bearing surface of rivets	1.63
Shearing area of rivets (".70 diameter)	3.46

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000			
10,000	.0014		
15,000	.0027		
20,000	.0039		
5,000		.0009	
25,000	.0054		
30,000	.0071		
35,000	.0091		
5,000		.0031	
40,000	.0117		
42,000	.0127		
44,000	.0135		
46,000	.0149		
48,000	.0159		
50,000	.0168		
52,000	.0179		
54,000	.0190		
56,000	.0200		
58,000	.0214		
60,000	.0229		Joint opened about ".01 or less.
5,000		.0109	
62,000	.0240		
64,000	.0249		
66,000	.0264		
68,000	.0279		
70,000	.0298		
72,000	.0314		
74,000	.0338		
76,000	.0361		
78,000	.0404		
80,000	.0445		
82,000	.0505		
84,000	.0541		
86,000	.0634		
88,000	.0724		Joint opened about ".03.
90,000	.0890		
105,300			Ultimate strength.

Fractured upper plate through line of four rivet holes. The fracture began at the holes.

Metal silky in appearance and well drawn down. After fracture the slip of the plates at the calked joint measured ".15. The joint was very greasy from oil used in punching.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	41,785
Tensile stain on net section of plate	65,400
Compressive strain on bearing surface of rivets	64,600
Shearing strain on rivets	30,430

No. 435.—¼" Steel Plate. Joint G . .

Same style of joint as No. 434.
Upper plate, 10" × ".254.
Under plate, 10" × ".254.
⅝" iron rivets, "Burden's best."
Punched holes: Punch, ".695 diameter; die, ".752 diameter.

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	Square inches.
Gross sectional area of plate	2.54
Net sectional area of plate	1.63
Bearing surface of rivets	1.66
Shearing area of rivets (".70 diameter)	3.46

Specimen warped on the side.

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	.....	.....	
10,000	.0003	.....	
15,000	.0010	.....	
20,000	.0014	.....	
5,000	.....	.0003	
25,000	.0024	.....	
30,000	.0037	.....	
35,000	.0053	.....	
5,000	.....	.0012	
40,000	.0077	.....	
44,000	.0092	.....	
48,000	.0110	.....	
50,000	.0122	.....	
52,000	.0131	.....	
54,000	.0142	.....	
56,000	.0152	.....	
58,000	.0162	.....	
60,000	.0172	.....	Joint hardly disturbed.
5,000	.....	.0077	
62,000	.0182	.....	
64,000	.0192	.....	
66,000	.0203	.....	
68,000	.0217	.....	
70,000	.0232	.....	
72,000	.0252	.....	
74,000	.0272	.....	
76,000	.0294	.....	
78,000	.0332	.....	
80,000	.0374	.....	Joint opened about ".03.
82,000	.0434	.....	
84,000	.0502	.....	
86,000	.0567	.....	
88,000	.0670	.....	
90,000	.0840	.....	
105,300	.....	.....	Ultimate strength.

Failure occurred in the same manner as with G . Appearance of fracture, silky. Metal well drawn down. Joint greasy from oil used in punching.

The slip of the plates at the calked edge after fracture measured ".20, the joint remaining open about ".05 to ".06.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	41,460
Tensile strain on net section of plate	64,600
Compressive strain on bearing surface of rivets	63,430
Shearing strain on rivets	30,430

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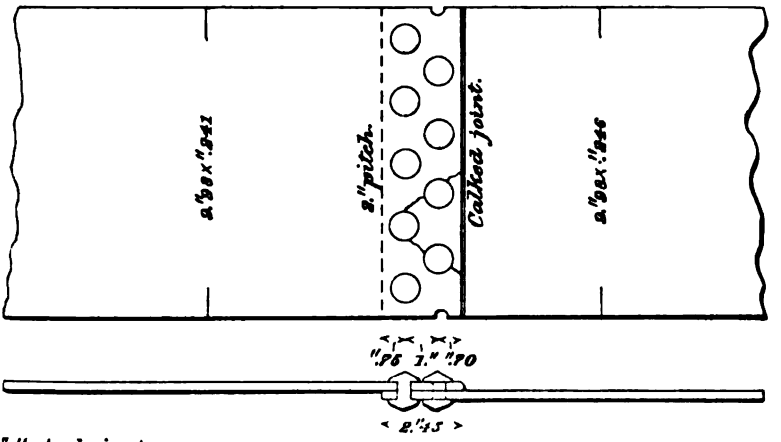
No. 87.—¼" Steel Plate. Joint I.



$\frac{7}{16}$" steel rivets.
Drilled holes, ".50 diameter.

	Square inches.
Gross sectional area of upper plate	2.41
Net sectional area of upper plate	1.80
Bearing surface of rivets	1.08
Shearing area of rivets	1.77

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0002		
20,000	.0012		
30,000	.0028		
35,000	.0038		
40,000	.0050		
45,000	.0068		
50,000	.0090		
5,000		.0045	
55,000	.0120		
60,000	.0155		
65,000	.0195		
70,000	.0240		
75,000	.0305		Joint opened perceptibly.
80,000	.0390		Joint opened ".01.
85,000	.0515		
90,000	.0715		Joint opened ".02. Rapid stretching of plate.
102,500			Ultimate strength. Sheared six rivets and tore out plate at three rivets.

[a] Average elongation of holes, about ".15.
[b] The minimum elongation, ".07; maximum, ".28.
[c] The metal on one side of the plate proved its elastic limit before the full surface, owing to the plates not being riveted together in line.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	42,530
Tensile strain on net section of plate	56,944
Compressive strain on bearing surface of rivets	94,910
Shearing strain on rivets	57,910

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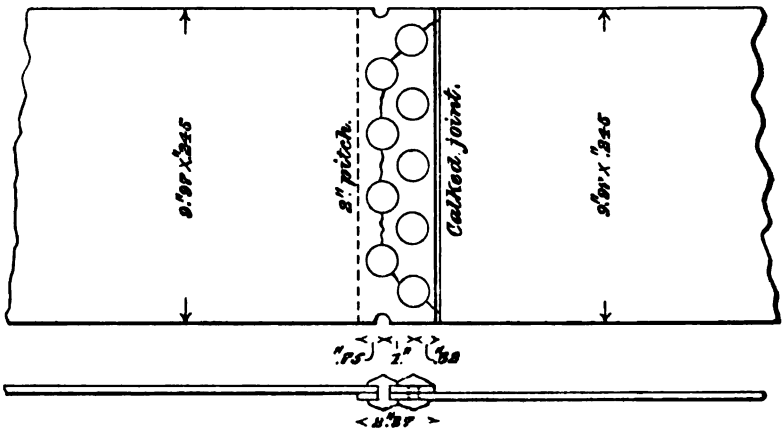
No. 88.—¼″ Steel Plate. Joint I . .



$\frac{7}{16}$″ steel rivets.
Drilled holes, ″.50 diameter.

	Square inches.
Gross sectional area of plate	2.44
Net sectional area of plate	1.83
Bearing surface of rivets	1.10
Shearing area of rivets	1.77

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0010		
20,000	.0038		
30,000	.0068		
40,000	.0110		
45,000	.0135		
50,000	.0162		
5,000		.0070	
55,000	.0198		
60,000	.0232		
65,000	.0280		
70,000	.0320		
75,000	.0370		
80,000	.0455		Joint opened perceptibly.
85,000	.0570		Joint opened .″01.
90,000	.0750		
95,000	.1450		Joint opened .″02.
108,200			Ultimate strength. Tore upper plate, as shown by lines on sketch.

Fine silky fractures; metal well drawn down.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	44,344
Tensile strain on net section of plate	59,130
Compressive strain on bearing surface of rivets	98,360
Shearing strain on rivets	61,130

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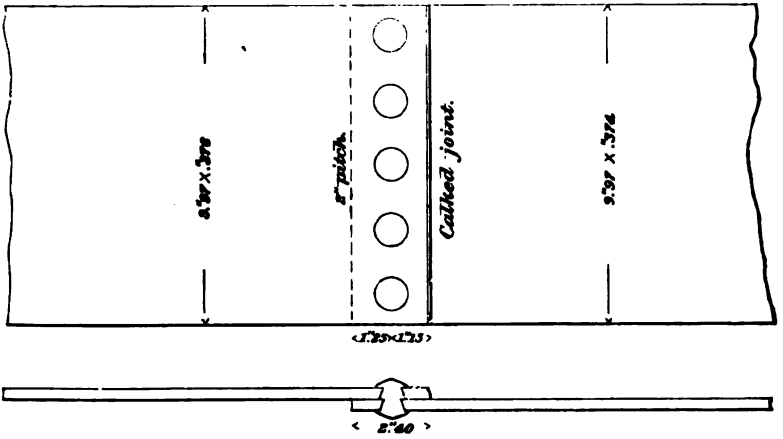
SINGLE-RIVETED LAP JOINTS, ⅜″ STEEL PLATE.

No. 51.—⅜″ STEEL PLATE. JOINT A.



⅞″ iron rivets, "Burden's best."
Punched holes: Punch, ".753 diameter; die, ".774 diameter.

	Square inches.
Gross sectional area of lower plate	3.73
Net sectional area of lower plate	2.30
Bearing surface of rivets	1.427
Shearing area of rivets (".76 diameter)	2.27

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0008		
20,000	.0022		
30,000	.0060		
35,000	.0082		
5,000		.0038	
40,000	.0115		
45,000	.0140		
50,000	.0182		
55,000	.0248		
60,000	.0328		Joint opened less than ".01.
65,000	.0495		Joint opened ".02.
70,000	.0699		Joint opened ".04.
75,000	.0980		
90,200			Ultimate strength. Sheared rivets.

Rivet holes elongated from ".03 to ".05.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	24,180
Tensile strain on net section of plate	39,220
Compressive strain on bearing surface of rivets	63,210
Shearing strain on rivets	39,740

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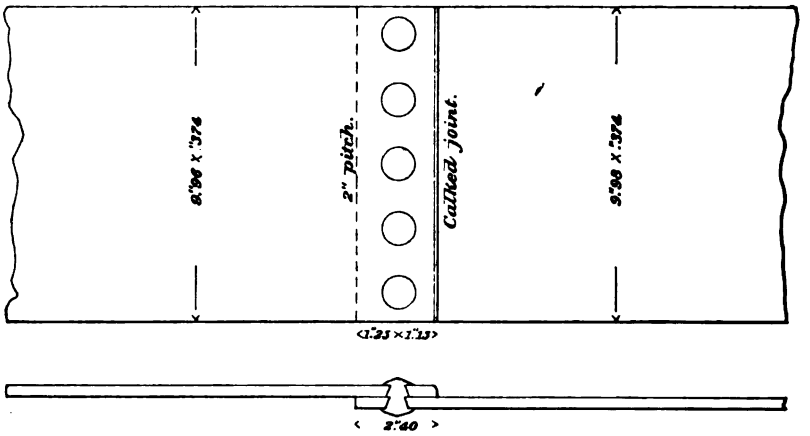
No. 52.—⅜″ Steel Plate. Joint A . .



11/16″ iron rivets, "Burden's best."
Punched holes.

	Square inches.
Gross sectional area of upper plate	3.73
Net sectional area of upper plate	2.30
Bearing surface of rivets	1.427
Shearing area of rivets (".76 diameter)	2.27

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	.0		
10,000	.0008		
20,000	.0020		
30,000	.0060		
35,000	.0085		Joint started perceptibly.
5,000		.0039	
38,000	.0108		
40,000	.0118		
42,000	.0130		
44,000	.0145		
46,000	.0158		
48,000	.0172		
50,000	.0189		Joint opened about ".01.
52,000	.0206		
54,000	.0230		
56,000	.0265		
58,000	.0318		
60,000	.0370		Joint opened ".02.
62,000	.0420		
64,000	.0485		Joint opened ".04.
66,000	.0560		
68,000	.0635		Joint opened ".05.
70,000	.0728		
5,000		.0553	
86,700			Ultimate strength. Sheared rivets.

Rivet holes elongated from ".03 to ".05.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	23,240
Tensile strain on net section of plate	37,700
Compressive strain on bearing surface of rivets	60,760
Shearing strain on rivets	38,190

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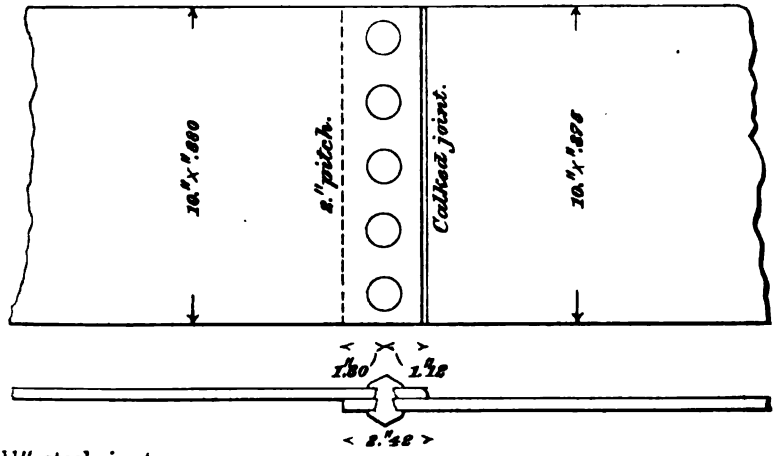
No. 53.—$\frac{3}{8}$″ STEEL PLATE. JOINT A A.



$\frac{11}{16}$″ steel rivets.

Punched holes: Punch, ″.753 diameter; die, ″.774 diameter.

	Square inches.
Gross sectional area of lower plate	3.75
Net sectional area of lower plate	2.32
Bearing surface of rivets	1.43
Shearing area of rivets (″.76 diameter)	2.27

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0008		
20,000	.0025		
30,000	.0060		
35,000	.0080		
5,000		.0030	
38,000	.0095		
40,000	.0110		
44,000	.0120		
46,000	.0130		
48,000	.0142		
50,000	.0159		
52,000	.0172		
54,000	.0190		Joint opened slightly.
56,000	.0203		
58,000	.0230		
60,000	.0260		
62,000	.0300		Joint opened ″.01.
64,000	.0340		
66,000	.0382		Joint open ″.02.
68,000	.0420		
70,000	.0461		Joint open ″.03.
72,000	.0510		
74,000	.0558		Joint open ″.04.
76,000	.0605		
78,000	.0661		Joint open ″.05.
80,000	.0725		
82,000	.0789		
84,000	.0845		
86,000	.0908		
88,000	.0980		
90,000	.1060		
128,100			Ultimate strength. Sheared rivets.

Average elongation of holes, ″.12.

Incipient fractures about rivet holes, indicating a close approach to the ultimate strength of the plate.

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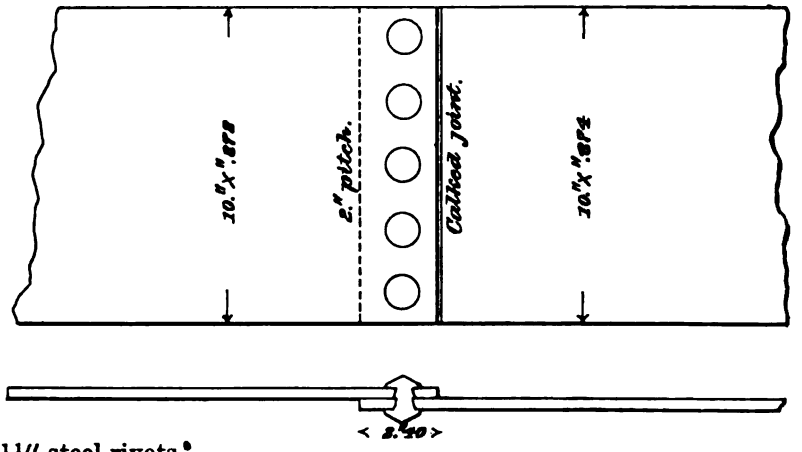
Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of lower plate	34,160
Tensile strain on net section of lower plate	55,215
Compressive strain on bearing surface of rivets	89,580
Shearing strain on rivets	56,430

No. 54.—$\frac{3}{8}$″ STEEL PLATE. JOINT A A . .



$\frac{11}{16}$″ steel rivets.

Punched holes: Punch, ″.753 diameter; die, ″.774 diameter.

	Square inches.
Gross sectional area of lower plate	3.75
Net sectional area of lower plate	2.32
Bearing surface of rivets	1.42
Shearing area of rivets (″.76 diameter)	2.27

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.	.....	
10,000	.0008	.....	
20,000	.0020	.....	
30,000	.0048	.....	
40,000	.0090	.....	
50,000	.0149	.....	
60,000	.0251	.....	Joint open about ″.01.
70,000	.0450	.....	
80,000	.0688	.....	
90,000	.1038	.....	
125,900	.....	.....	Ultimate strength. Sheared rivets.

Incipient fracture about rivet holes same as were developed in specimen A A .

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	33,840
Tensile strain on net section of upper plate	54,740
Compressive strain on bearing surface of rivets	88,660
Shearing strain on rivets	55,460

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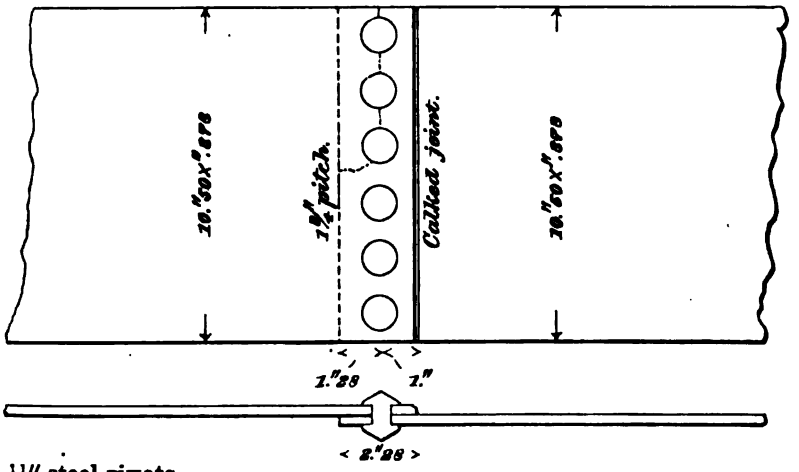
No. 55.—$\frac{3}{8}$" STEEL PLATE. JOINT E.



$\frac{11}{16}$" steel rivets.
Drilled holes, ".77 diameter.

	Square inches.
Gross sectional area of plate	3.97
Net sectional area of plate	2.22
Bearing surface of rivets	1.746
Shearing area of rivets (".77 diameter)	2.79

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0006		
20,000	.0016		
30,000	.0032		
35,000	.0048		
5,000		.0011	
40,000	.0070		
45,000	.0096		Joint opened perceptibly.
50,000	.0126		
55,000	.0156		
60,000	.0190		Joint open ".01.
65,000	.0245		
68,000	.0282		Joint open ".02.
70,000	.0330		
72,000	.0362		Joint open ".03.
75,000	.0420		
78,000	.0480		Joint open ".04.
80,000	.0522		
85,000	.0640		
90,000	.0770		
100,090	.1100		
124,400			Scale starts off entire plate.
141,300			Ultimate strength.

Sheared three rivets and tore apart the lower plate across three rivet holes, the metal showing a silky fracture, and drawing down well.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	35,590
Tensile strain on net section of plate	63,650
Compressive strain on bearing surface of rivets	80,930
Shearing strain on rivets	50,650

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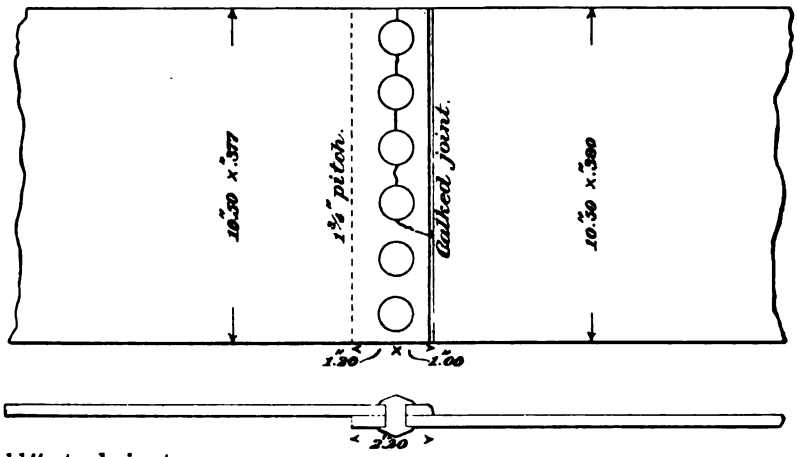
No. 56.—⅜″ Steel Plate. Joint E . .



$\frac{11}{16}$″ steel rivets.
Drilled holes, ″.77 diameter.

	Square inches.
Gross sectional area of upper plate	3.96
Net sectional area of upper plate	2.22
Bearing surface of rivets	1.74
Shearing area of rivets (″.77 diameter)	2.79

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.	.....	Plates not straight.
10,000	0.	.....	
20,100	.0010	.....	
30,000	.0018	.....	
35,000	.0021	.....	
5,000	.....	.0005	
40,000	.0039	.....	
45,000	.0056	.....	
50,000	.0085	.....	Joint opened perceptibly at 53,000 pounds tension.
55,000	.0125	.....	
60,000	.0168	.....	
65,000	.0225	.....	Joint open ″.01.
68,000	.0278	.....	
70,000	.0310	.....	Joint open ″.02.
72,000	.0348	.....	
75,000	.0410	.....	Joint open ″.03.
78,000	.0480	.....	Joint open ″.04.
80,000	.0530	.....	Joint open ″.05.
85,000	.0680	.....	
90,000	.0860	.....	
95,000	.1110	.....	
100,000	.1350	.....	
122,000	.....	.....	Scale starts off plates.
142,000	.....	.....	Ultimate strength.

Sheared two rivets and tore plate across four rivet holes in upper plate.
Silky fractures, the metal well drawn down.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	35,860
Tensile strain on net section of upper plate	63,976
Compressive strain on bearing surface of rivets	81,600
Shearing strain on rivets	50,900

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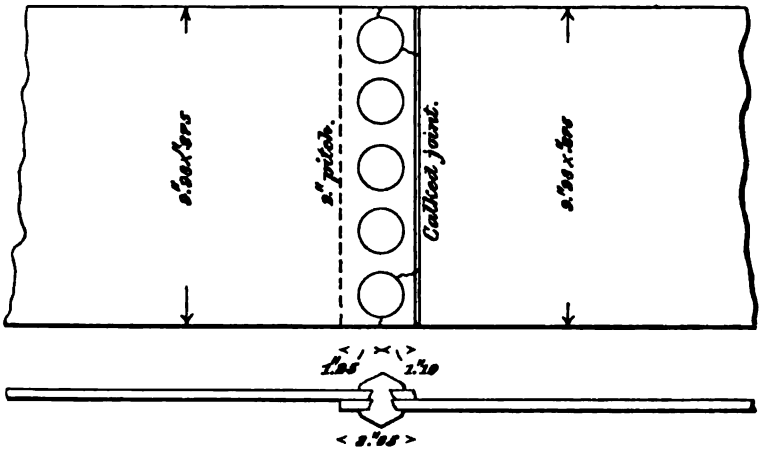
No. 238.—⅜″ Steel Plate. Joint C C.



⅞″ steel rivets.
Punched holes: Punch, $1\frac{3}{16}$″ diameter; die, ⅞″ diameter.

	Square inches.
Gross sectional area of upper plate	3.74
Net sectional area of upper plate	2.16
Bearing surface of rivets	1.58
Shearing area of rivets (″.82 diameter)	2.64

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0010		
20,000	.0030		
30,000	.0055		
35,000	.0070		
5,000		.0012	
40,000	.0090		
45,000	.0112		
50,000	.0135		
55,000	.0165		
60,000	.0200		
65,000	.0242		Joint opened perceptibly.
5,000		.0130	
70,000	.0308		Joint open ″.01.
75,000	.0380		
80,000	.0540		Joint open ″.02.
85,000	.0700		Joint open ″.03.
90,000	.0830		
95,000	.0990		Joint open ″.04.
100,000	.1150		Joint open ″.05.
105,000	.1360		
110,000	.1630		
141,400			Ultimate strength. Sheared three rivets. Tore upper plate at end rivets.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	37,810
Tensile strain on net section of plate	65,460
Compressive strain on bearing section of rivets	89,490
Shearing strain on rivets	53,560

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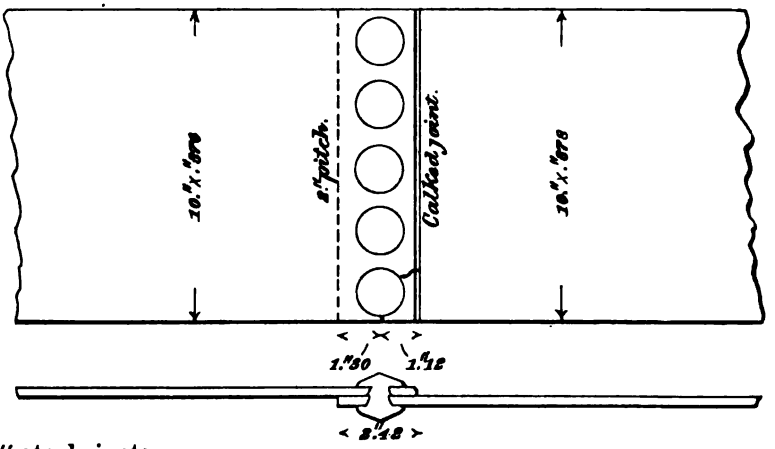
No. 239.—⅜″ Steel Plate. Joint C C . .



¾″ steel rivets.
Punched holes: Punch, $\frac{13}{16}$″ diameter; die, ⅞″ diameter.

	Square inches
Gross sectional area of upper plate	3.76
Net sectional area of upper plate	2.17
Bearing surface of rivets	1.59
Shearing area of rivets (".82 diameter)	2.64

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0006		
20,000	.0019		
30,000	.0045		
35,000	.0060		
5,000		.0018	
40,000	.0079		
45,000	.0095		
50,000	.0112		
5,000		.0032	
55,000	.0140		
60,000	.0170		
65,000	.0212		Joint opened perceptibly.
5,000		.0106	
70,000	.0295		Joint open ".01.
75,000	.0380		
80,000	.0520		Joint open ".02.
85,000	.0660		
90,000	.0790		Joint open ".04.
100,000	.1125		Micrometer removed.
110,000	.1500		
120,000	.2800		
130,000	.4700		
140,000	.6800		
141,500	.7800		Ultimate strength. Sheared four rivets. Tore out plate at end rivet, upper plate.

At time of maximum load the joint had slipped at the calked end ".40.
Elongation of holes in upper plate, punch side, ".15; die side, ".29.
Elongation of holes in lower plate, punch side, ".13; die side, ".07.
Fractures were started about two holes in the upper plate where the rivets had sheared, showing the metal was near the point of tearing out.

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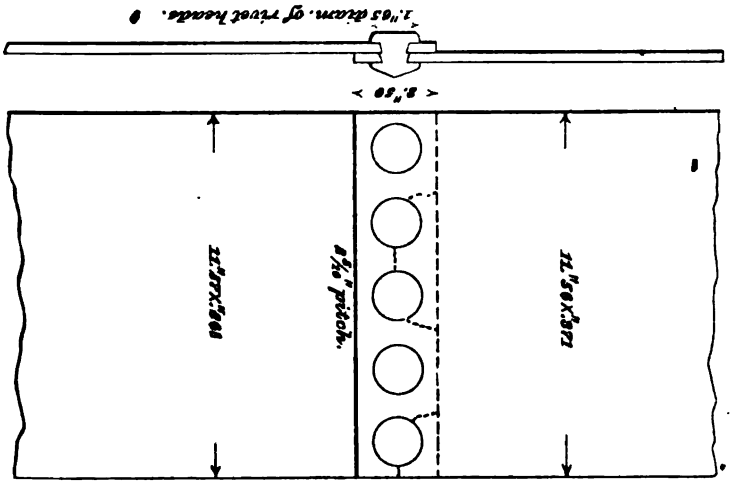
Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	37,630
Tensile strain on net section of plate	65,210
Compressive strain on bearing surface of rivets	88,990
Shearing strain on rivets	53,600

No. 718.—$\frac{3}{8}$″ Steel Plate. Set K.



1″ iron rivets, hand-driven.
Punched holes: Punch, $1\frac{1}{16}$″ diameter; die, $1\frac{5}{32}$″ diameter.

	Square inches.
Gross sectional area of under plate	4.26
Net sectional area of under plate	2.21
Bearing surface of rivets	2.04
Shearing area of rivets	4.43

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	.0.		
10,000	.0008		
20,000	.0028		
30,000	.0050		
35,000	.0068		
5,000		.0020	
40,000	.0088		
45,000	.0118		
50,000	.0148		
55,000	.0180		
60,000	.0215		
65,000	.0252		
70,000	.0298		
75,000	.0340		
80,000	.0388		
90,000	.07		
100,000	.11		
110,000	.14		
120,000	.19		
130,000	.24		
140,000	.30		
150,000	.49		
162,200			Ultimate strength.

Sheared two rivets and tore out plate at three rivets under plate.
Elongation of two rivet holes, ″.26 each.
Fracture of plate silky.

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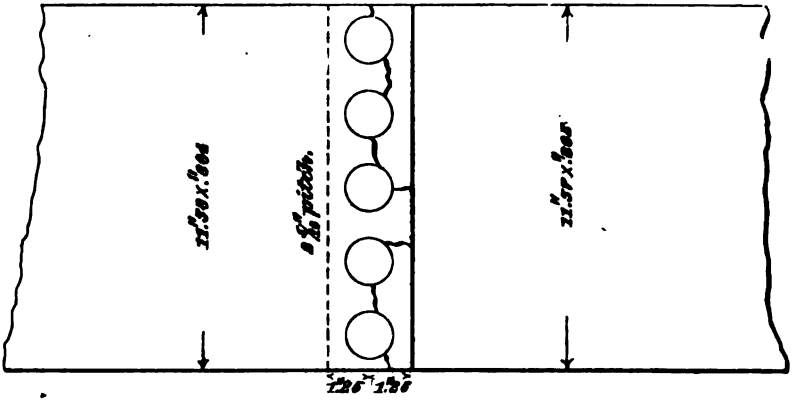
Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of under plate	38,075
Tensile strain on net section of under plate	73,394
Compressive strain on bearing surface of rivets	79,510
Shearing strain on rivets	36,614

No. 719.—$\frac{3}{8}$″ STEEL PLATE. SET K . .

Duplicate of K .



1″ iron rivets, hand-driven.
Punched holes: Punch, $1\frac{1}{16}$″ diameter; die, $1\frac{5}{32}$″ diameter.

	Square inches.
Gross sectional area of upper plate	4.22
Net sectional area of upper plate	2.19
Bearing surface of rivets	2.02
Shearing area of rivets	4.43

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.	.....	
10,000	.0010	.....	
20,000	.0030	.....	
30,000	.0051	.....	
35,000	.0065	.....	
5,000	.....	.0008	
40,000	.0080	.....	
45,000	.0100	.....	
55,000	.0150	.....	
60,000	.0161	.....	
65,000	.0200	.....	
70,000	.0240	.....	
75,000	.0290	.....	
80,000	.0340	.....	
85,000	.0388	.....	
90,000	.048	.....	
95,000	.056	.....	
100,000	.070	.....	
110,000	.11	.....	
120,000	.13	.....	
130,000	.18	.....	
140,000	.24	.....	
150,000	.47	.....	
160,000	.67	.....	
162,000	.....	.....	Ultimate strength.

Tore out upper plate.

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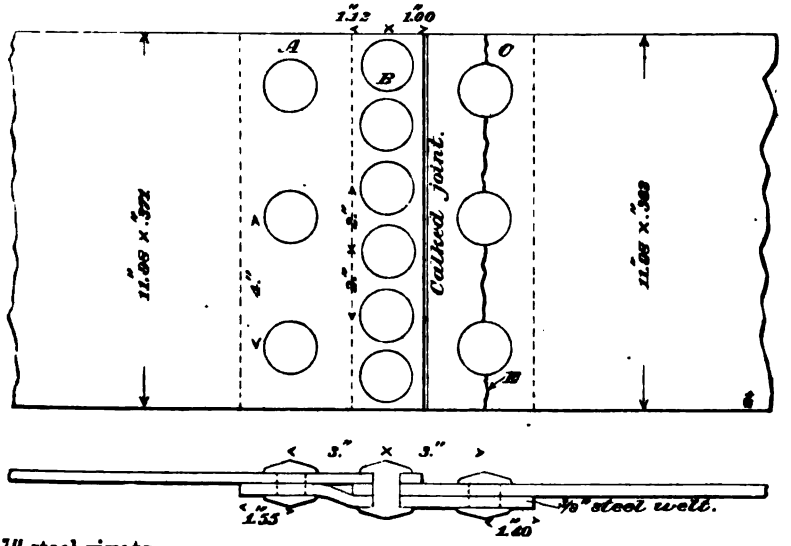
Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	38,390
Tensile strain on net section of upper plate	73,970
Compressive strain on bearing surface of rivets	80,200
Shearing strain on rivets	36,590

SINGLE-RIVETED LAP JOINTS, WITH REINFORCE WELT, ⅜″ STEEL PLATE.

No. 246.—⅜″ STEEL PLATE. JOINT J.



⅜″ steel rivets.
Drilled holes, ″.94 diameter.

	Square inches.
Gross sectional area of under plate	4.34
Net sectional area of under plate through line of holes *B*	2.30
Net sectional area of under plate through line of holes *C*	3.32
Bearing surface of rivets (9) on under plate	3.06
Shearing area of 9 rivets (″.94 diameter), single shear	6.25

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0005		
20,000	.0018		
30,000	.0030		
35,000	.0038		
5,000		.0010	
40,000	.0045		
50,000	.0055		
60,000	.0092		
5,000		.0038	
65,000	.0112		
70,000	.0130		
75,000	.0148		
80,000	.0160		
85,000	.0180		
90,000	.0200		
95,000	.0218		Joint opened perceptibly.
100,000	.0240		
5,000		.0131	
105,000	.0270		
110,000	.0295		

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Loads applied.	Elongation in 10 inches.	Permanent set	Remarks.
Pounds.	*Inch.*	*Inch.*	
115,000	.0325	.....	Joint open ".01.
120,000	.0365	.....	
125,000	.0418	.....	
130,000	.0480	.....	
135,000	.0580	.....	
140,000	.0820	.....	Micrometer removed.
145,000	.13	.....	
150,000	.16	.....	
155,000	.21	.....	
206,000	.....	.....	Ultimate strength. Fractured under plate at outside row of rivets.

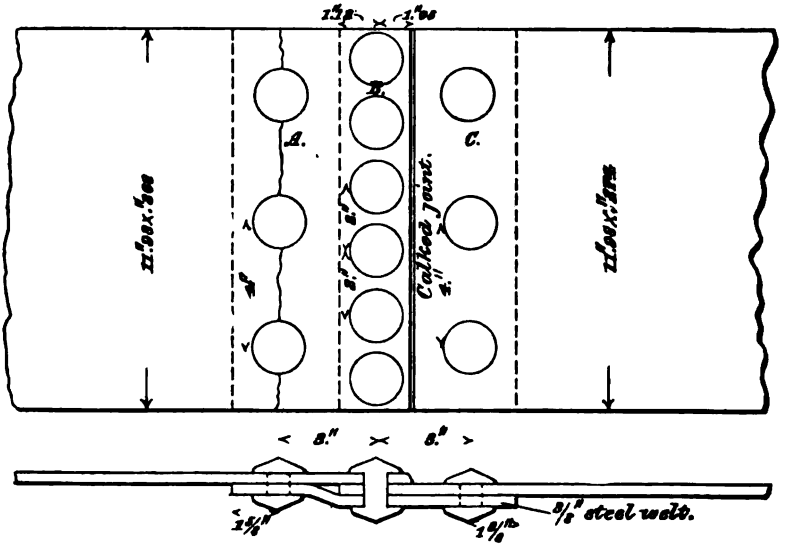
Fracture, silky seam in steel through one end section at *E*. After fracture, holes in welt elongated about ".02 each; upper plate, outside row of 3 holes, elongated ".20; upper plate, inside row of 6 holes, elongated ".06.

Before fracture the plates drew down from 11".98 to about 11".68 in width; the line of the joint bent concave and wavy.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of lower plate	47,465
Tensile strain on net section of under plate through line of holes *B*	89,505
Tensile strain on net section of under plate through line of holes *C*	62,050
Shearing strain on 9 rivets, single shear	32,960
Compressive strain on bearing surface of rivets (9) in under plate	67,320

No. 247.—⅜" Steel Plate. Joint J.



⅞" steel rivets.
Drilled holes, ".94 diameter.
⅜" steel welt.

	Square inches.
Gross sectional area of upper plate	4.41
Net sectional area of upper plate through line of holes *A*	3.37
Net sectional area of upper plate through line of holes *B*	2.33
Bearing surface of 9 rivets, upper plate	3.11
Shearing area of 9 rivets (".94 diameter), single shear	6.25

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Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0005		
20,000	.0012		
30,000	.0022		
35,000	.0029		
5,000		.0010	
40,000	.0038		
50,000	.0058		
60,000	.0080		
5,000		.0038	
65,000	.0098		
70,000	.0110		
75,000	.0128		
80,000	.0142		
85,000	.0158		
90,000	.0170		Joint opened perceptibly.
95,000	.0188		
100,000	.0200		
5,000		.0108	
105,000	.0222		
110,000	.0240		
115,000	.0262		
120,000	.0295		
125,000	.0330		
130,000	.0382		
135,000	.0460		
140,000	.0640		Micrometer removed.
145,000	.12		
150,000	.15		
155,000	.18		
160,000	.22		
165,000	.26		
170,000	.30		
175,000	.34		
180,000	.37		
185,000	.43		
190,000	.48		
195,000	.52		
200,000	.58		
205,000	.68		
210,000	.79		
211,900			Ultimate strength. Fractured upper plate through outside row of rivets.

Fracture began at end rivet hole. This outside section has seam through the steel, same in appearce as developed in the test of J .
Fractures otherwise silky.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	48,050
Tensile strain on net section of upper plate across lines of holes *A*	62,880
Tensile strain on net section of upper plate across lines of holes *B*	90,940
Compressive strain on bearing surface of 9 rivets, upper plate	68,135
Shearing strain on 9 rivets, single shear	33,90

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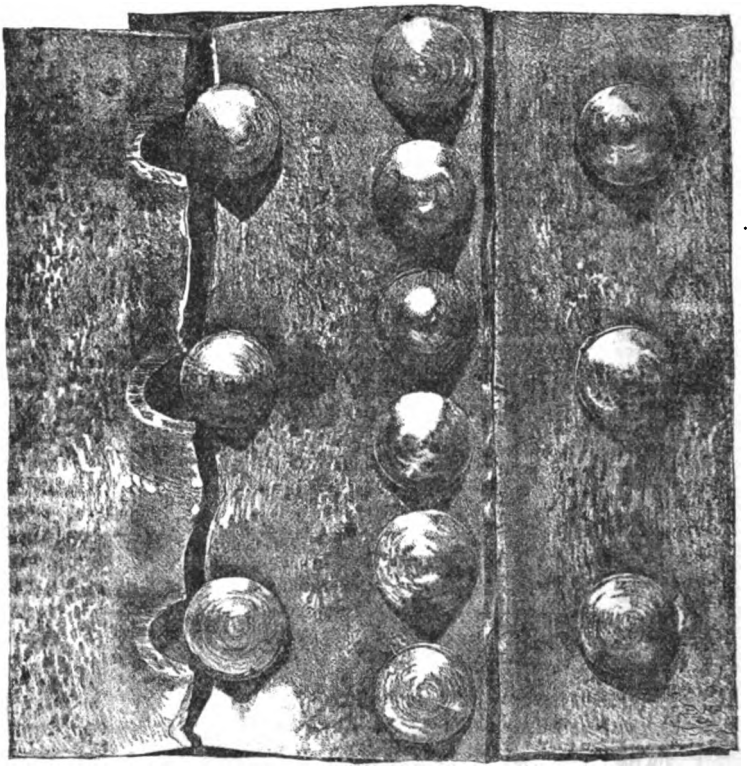
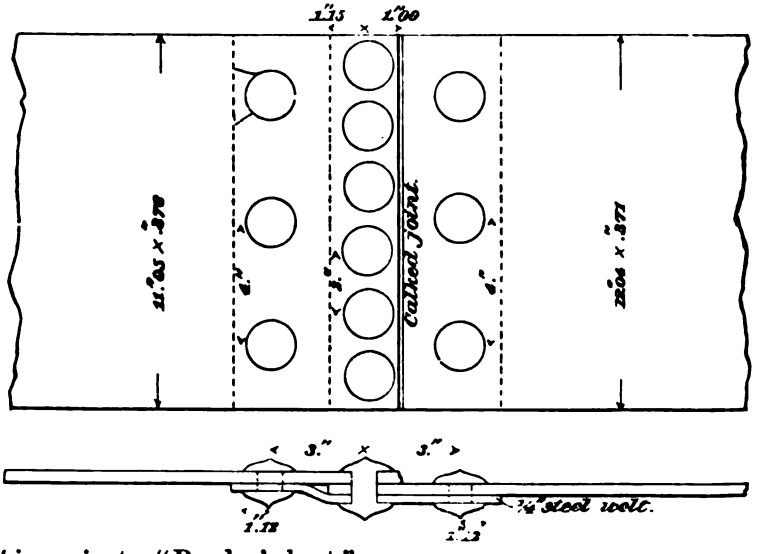


Photograph of joint No. 247. Appearance after the fracture.

No. 298.—⅜″ Steel Plates. Joint J J.



⅞″ iron rivets, "Burden's best."
Drilled holes, ".93 diameter.

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	Square inches.
Gross sectional area of under plate	4.47
Net sectional area of under plate across row of three rivet holes	3.43
Bearing surface of rivets	3.11
Shearing area of rivets (9 rivets, single shear)	6.11

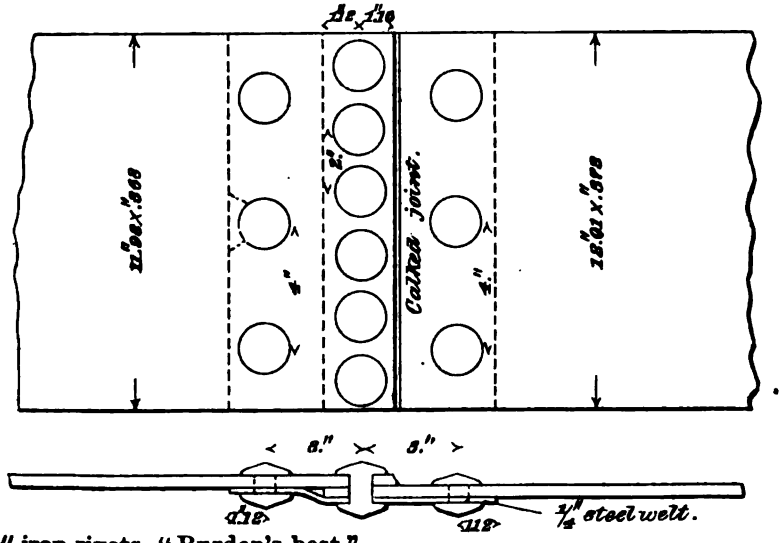
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	.0		
10,000	.0005		
20,000	.0015		
30,000	.0028		
40,000	.0046		
50,000	.0075		
5,000		.0018	
60,000	.0108		
70,000	.0150		
80,000	.0198		
90,000	.0248		
100,000	.0320		
110,000	.0400		
120,000	.0560		
130,000	.09		
140,000	.11		
150,000	.17		
209,300			Ultimate strength. Sheared eight rivets and tore out one hole in ¼" welt.

	Inch.
Average elongation of rivet holes in upper plate, outside row (3 holes)	.32 each.
Upper plate, inside row (6 holes)	.24 each.
Lower plate, inside row (6 holes)	.26 each.
¼" welt, inside row (6 holes)	about .02 each.
¼" welt, outside row (3 holes)	.31 each.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of under plate	46,820
Tensile strain on net section of under plate across line of three rivet holes	61,020
Compressive strain on bearing surface of rivets	67,300
Shearing strain on rivets (single shear)	34,250

No. 299.—⅜" Steel Plate. Joint J J . .



¾" iron rivets, "Burden's best."
Drilled holes, ".93 diameter.

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	Square inches.
Gross sectional area of under plate	4.48
Net sectional area of under plate across row of three rivet holes	3.44
Bearing surface of rivets	3.12
Shearing area of rivets (single shear)	6.11

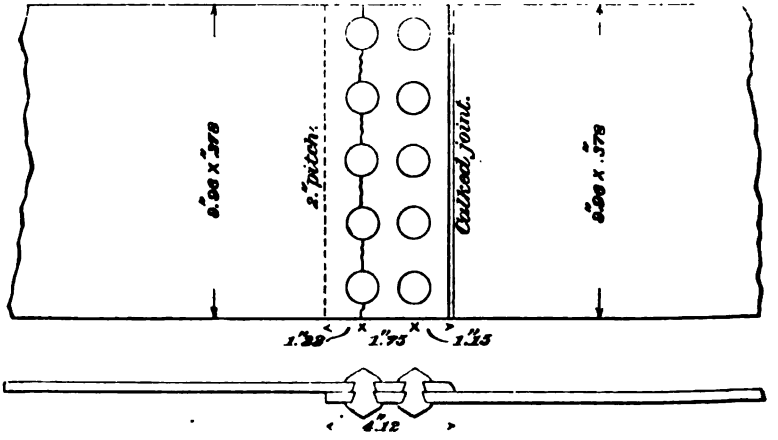
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	.0		
10,000	.0005		
20,000	.0010		
30,000	.0022		
40,000	.0042		
50,000	.0072		
5,000		.0022	
60,000	.0110		
70,000	.0148		
80,000	.0190		
90,000	.0230		
100,000	.029		
110,000	.06		
120,000	.07		
130,000	.08		
140,000	.11		
150,000	.19		
212,300			Ultimate strength. Sheared eight rivets; tore out ¼" welt at middle rivet, outside row.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of under plate	47,390
Tensile strain on net section of under plate across row of three rivet holes	61,710
Compressive strain on bearing surface of rivets	68,040
Shearing strain on rivets (single shear)	34,750

DOUBLE-RIVETED LAP-JOINTS, ⅜" STEEL PLATE.

No. 57.—⅜" Steel Plate. Joint F.



1⅛" iron rivets, "Burden's best."
Punched holes: Punch, ".753 diameter; die, ".774 diameter.

	Square inches.
Gross sectional area of plate	3.76
Net sectional area of plate	2.32
Bearing surface of rivets	2.89
Shearing area of rivets (".76 diameter)	4.54

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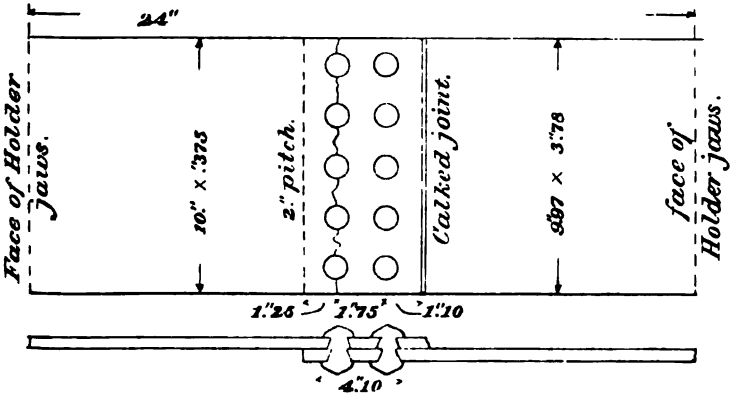
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0010		
20,000	.0030		
30,000	.0050		
35,000	.0068		
5,000		.0020	
40,000	.0080		
45,000	.0100		
50,000	.0121		
55,000	.0142		
60,000	.0170		Joint opened perceptibly.
65,000	.0200		
70,000	.0240		
75,000	.0285		Joint open ".01.
80,000	.0330		
85,000	.0389		
90,000	.0440		Joint open ".02.
95,000	.0508		
100,000	.0580		Joint open ".03.
105,000	.0678		
110,000	.0830		Joint open ".06. Scale started off plates.
146,700			Ultimate strength.

Fractured upper plate along line of rivet holes; silky fractures; metal drew down well, and fractured in each section at the same time.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	39,020
Tensile strain on net section of plate	62,800
Compressive strain on bearing surface of rivets	50,760
Shearing strain on rivets	32,310

No. 59.—$\frac{3}{8}$" Steel Plate. Joint F . .



$\frac{11}{16}$" iron rivets, "Burden's best."
Punched holes: Punch, ".753 diameter; die, ".774 diameter.

	Square inches.
Gross sectional area of upper plate	3.73
Net sectional area of upper plate	2.31
Bearing surface of rivets	2.85
Shearing area of rivets (".76 diameter)	4.54

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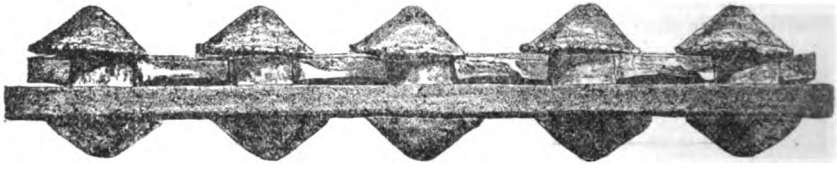
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.	.....	
10,000	.0008	.....	
20,000	.0015	.....	
30,000	.0025	.....	
40,000	.0042	.....	
50,000	.0069	.....	
5,000	.....	.0009	
55,000	.0081	.....	
60,000	.0100	.....	
65,000	.0118	.....	
70,000	.0140	.....	
5,000	.....	.0040	
75,000	.0168	.....	Joint opened perceptibly.
80,000	.0205	.....	
85,000	.0250	.....	
90,000	.0310	.....	Joint open ".01.
95,000	.0370	.....	
100,000	.0430	.....	
105,000	.0505	.....	Joint open ".03.
110,000	.0590	.....	
5,000	.....	.0430	
149,500	.....	.....	Ultimate strength.

Fractured upper plate. Silky fractures.

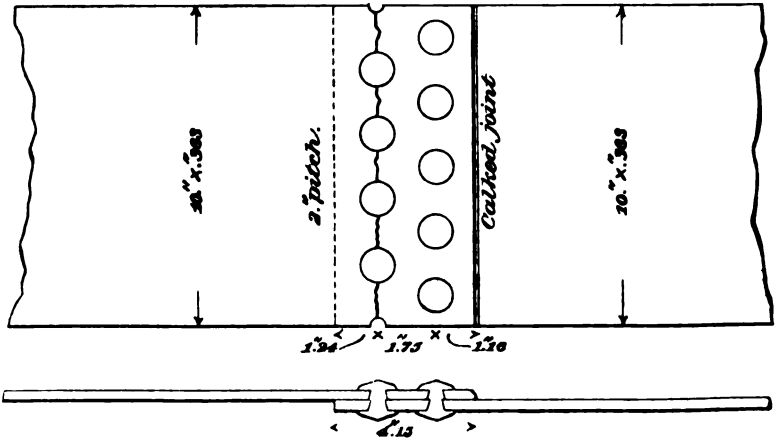
Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	40,080
Tensile strain on net section of upper plate	64,720
Compressive strain on bearing surface of rivets	52,450
Shearing strain on rivets	32,930



Photograph showing eccentricity of rivet heads, Joint No. 59.

No. 60.—⅜" Steel Plate. Joint G.



1⅛" iron rivets, "Burden's best."
Punched holes: Punch, ".753 diameter; die, ".774 diameter.

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	Square inches.
Gross sectional area of plate	3.63
Net sectional area of plate	2.24
Bearing surface of rivets	2.49
Shearing area of rivets (".76 diameter)	4.08

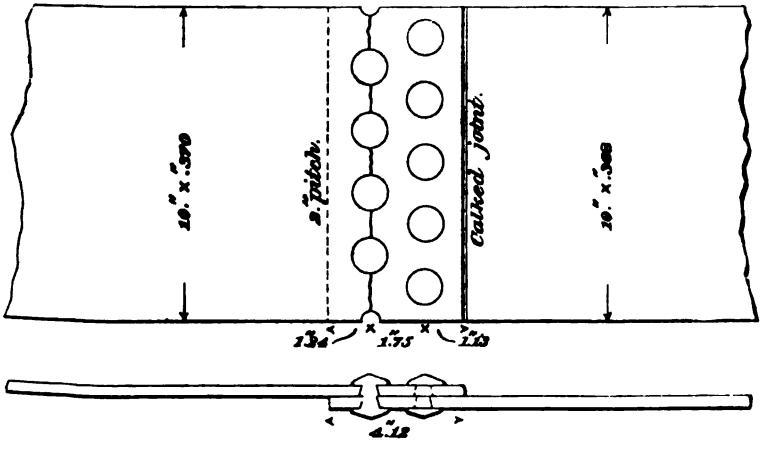
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0008		
20,000	.0020		
30,000	.0040		
40,000	.0068		
50,000	.0108		
5,000		.0029	
60,000	.0160		
65,000	.0190		
70,000	.0231		
5,000		.0106	
75,000	.0280		Joint open perceptibly.
80,000	.0339		Joint open ".01.
85,000	.0398		
90,000	.0460		Joint open ".02.
5,000		.0300	
95,000	.0540		Joint open ".03.
100,000	.0668		
105,000	.0778		Joint open ".05.
110,000	.0920		
115,000	.1098		
141,600			Ultimate strength.

Fractured upper plate along line of rivet holes; silky fractures; metal hard about holes, with small granular spots near punched holes.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	39,010
Tensile strain on net section of plate	63,210
Compressive strain on bearing surface of rivets	56,860
Shearing strain on rivets	34,710

No. 61.—$\frac{3}{8}$" Steel Plate. Joint G . .



$\frac{11}{16}$" iron rivets, "Burden's best."
Punched holes: Punch, ".753 diameter; die, ".774 diameter.

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	Square inches.
Gross sectional area of upper plate	3.70
Net sectional area of upper plate	2.29
Bearing surface of rivets	2.54
Shearing area of rivets (".76 diameter)	4.08

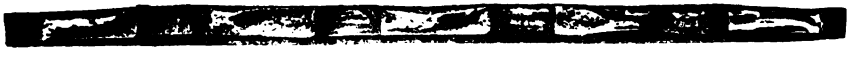
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	.0		
10,000	.0005		
20,000	.0013		
30,000	.0028		
40,000	.0046		
50,000	.0079		
5,000		.0021	
60,000	.0122		
65,000	.0150		
70,000	.0180		
5,000		.0085	
75,000	.0238		Joint opened perceptibly.
80,000	.0288		Joint open ".01.
85,000	.0340		Joint open ".02.
90,000	.0405		Joint open ".03.
5,000		.0271	Joint open ".01+.
95,000	.0480		Joint open ".04.
100,000	.0605		Joint open ".05.
105,000	.0720		
110,000			Approximately the elastic limit of the plate = 29,730 pounds per square inch.
125,800			Ultimate strength. Fractured plate.

Sharp but not loud report heard at 100,000 pounds and again heard just before fracture of the plate.

Fractured plate across row of four rivet holes; the metal first separated at the middle sections, which displayed in part fine granular fractures and in part silky appearance.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	34,000
Tensile strain on net section of upper plate	54,930
Compressive strain on bearing surface of rivets	49,530
Shearing strain on rivet	30,630



Photograph of fractured plate, showing granular metal, next two rivet holes, radiating from rivet holes.

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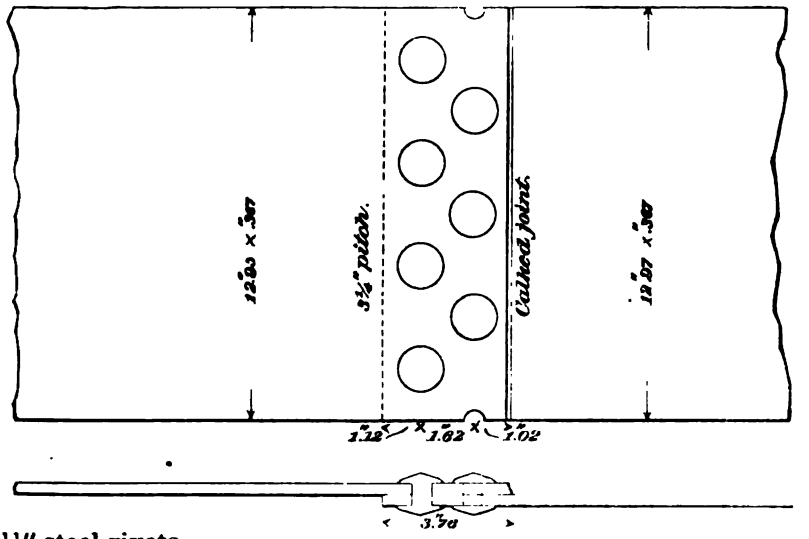
No. 83.—⅜″ Steel Plate. Joint I.



⅞″ steel rivets.
Drilled holes, ″.75 diameter.

	Square inches.
Gross sectional area of upper plate	4.75
Net sectional area of upper plate	3.65
Bearing surface of rivets	1.93
Shearing area of rivets (″.75 diameter)	3.09

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	0.		
20,000	.0011		
30,000	.0029		
40,000	.0053		
50,000	.0090		
60,000	.0143		
65,000	.0170		
5,000		.0079	
70,000	.0200		
75,000	.0230		
80,000	.0260		Joint started perceptibly.
85,000	.0309		
90,000	.0340		Joint open ″.01.
95,000	.0408		
100,000	.0528		Joint open ″.03.
105,000	.0620		Joint open ″.05.
110,000	.0708		
115,000	.0815		
120,000	.0945		
125,000	.1085		
130,000	.1220		
163,000			Ultimate strength. Sheared rivets.

Average elongation of holes, ″.13 each.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	34,316
Tensile strain on net section of plate	44,660
Compressive strain on bearing surface of rivets	84,460
Shearing strain on rivets	52,750

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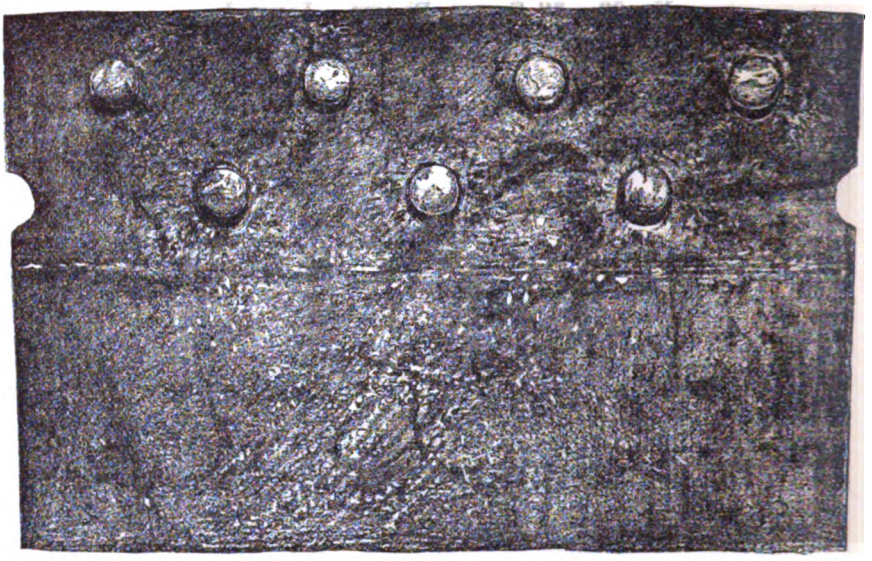

Photograph of under plate, Joint No. 83. Appearance after rivets were sheared, showing the development of "Cooper lines."

No. 84.—$\frac{3}{8}$″ STEEL PLATE. JOINT I . .

Same style of joint as No. 83.
Upper plate, 12″.96 × ″.368.
Under plate, 12″.96 × ″.370.
$\frac{11}{16}$″ steel rivets.
Drilled holes, ″.75.

	Square inches.
Gross sectional area of upper plate	4.77
Net sectional area of upper plate	3.67
Bearing surface of rivets	1.93
Shearing area of rivets (″.75 diameter)	3.09

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	0.		
20,000	.0008		
30,000	.0018		
40,000	.0039		
50,000	.0070		
55,000	.0090		
60,000	.0108		
65,000	.0121		
5,000		.0061	
70,000	.0140		
75,000	.0160		
80,000	.0192		
85,000	.0225		
90,000	.0270		Joint opened perceptibly.
95,000	.0330		Joint open ″.01.
100,000	.0425		
105,000	.0515		Joint open ″.02.
110,000	.0628		Joint open ″.03.
115,000	.0700		Joint open ″.04.
120,000	.0830		Joint open ″.05.
160,200			Ultimate strength. Sheared rivets.

Average elongation of rivet holes, ″.13 each.

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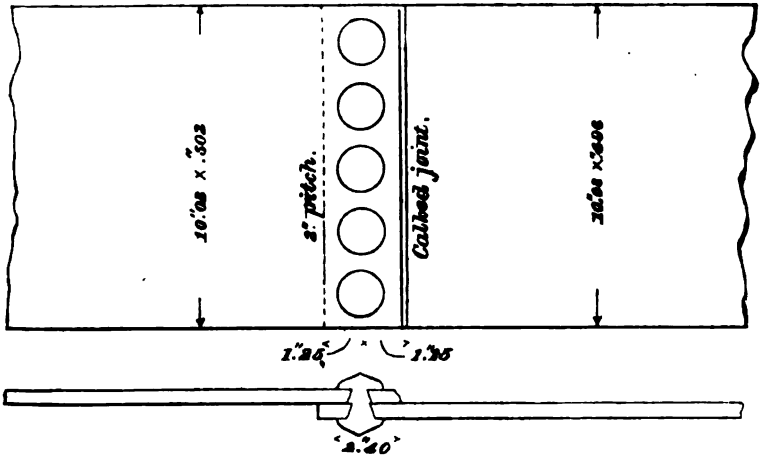
Maximum loads on joint.

	Pounds per sq. inch.
Tensile strength on gross section of plate	33,585
Tensile strength on net section of plate	43,650
Compressive strain on bearing surface of rivets	83,000
Shearing strain on rivets	83,000

SINGLE AND DOUBLE RIVETED LAP JOINTS, ¼" STEEL PLATE.

No. 242.—½" STEEL PLATE. JOINT A.



⅝" iron rivets, "Burden's best."
Punched holes: Punch, 1 1/16" diameter; die, 1 3/16" diameter.

	Square inches.
Gross sectional area of under plate	4.97
Net sectional area of under plate	2.84
Bearing surface of rivets	2.13
Shearing area of rivets (".82 diameter)	2.64

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0009		
20,000	.0020		
30,000	.0042		
35,000	.0068		
5,000		.0025	
10,000	.0030		
20,000	.0045		
30,000	.0060		
35,000	.0068		
5,000		.0025	
40,000	.0095		
45,000	.0125		
50,000	.0160		
5,000		.0080	
10,000	.0088		
20,000	.0102		
30,000	.0120		
40,000	.0141		
50,000	.0168		
55,000	.0190		
60,000	.0225		Joint opened perceptibly.
65,000	.0280		
70,000	.0360		
75,000	.0462		Joint open ".01.
80,000	.0590		
85,000	.0760		Joint open ".02½.
90,000	.097		
100,000			Micrometer removed.
106,500			Ultimate strength. Sheared rivets.

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Failure took place immediately after the first warning that the rivets were yielding.

Elongation of rivet holes from ".04 to ".06.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	21,830
Tensile strain on net section of plate	38,204
Compressive strain on bearing surface of rivets	50,940
Shearing strain on rivets	41,100

No. 243.—½" Steel Plate. Joint A..

Same style of joint as No. 242.
Under plate, 10".04 × ".500.
Under plate, 10".04 × ".495.
¾" iron rivets, "Burden's best."
Punched holes: Punch, $\frac{13}{16}$" diameter; $\frac{29}{32}$" diameter of die.

	Square inches.
Gross sectional area of under plate	4.97
Net sectional area of under plate	2.84
Bearing surface of rivets	2.13
Shearing area of rivets (".82 diameter)	2.64

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0008		
20,000	.0020		
30,000	.0035		
35,000	.0050		
5,000		.0012	
40,000	.0080		
45,000	.0118		
50,000	.0150		
5,000		.0068	
55,000	.0180		
60,000	.0220		
65,000	.0300		Joint opened perceptibly.
70,000	.0395		
75,000	.0500		Joint open ".01.
80,000	.0630		
85,000	.0790		Micrometer removed.
90,000	.11		
95,000	.13		
100,000	.16		
102,000			Ultimate strength. Sheared rivets.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	20,523
Tensile strain on net section of plate	35,915
Compressive strain on bearing surface of rivets	47,890
Shearing strain on rivets	38,636

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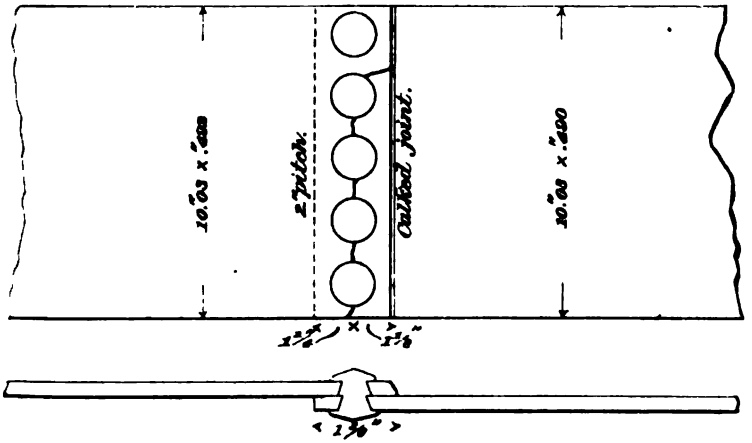
No. 294.—½″ Steel Plate. Joint A A.



⅛″ iron rivets, "Burden's best."
Punched holes: Punch, 1″ diameter; die, 1 1/16″ diameter.

	Square inches.
Gross sectional area of upper plate	4.93
Net sectional area of upper plate	2.40
Bearing surface of rivets	2.536
Shearing area of rivets (1″ diameter)	3.93

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0006		
20,000	.0019		
30,000	.0035		
35,000	.0042		
5,000		.0010	
40,000	.0058		
45,000	.0071		
50,000	.0091		Joint started perceptibly.
55,000	.0115		Joint open ".01.
60,000	.0142		
65,000	.0170		
70,000	.0210		
75,000	.0278		
80,000	.0368		
85,000	.0445		
90,000	.0550		Joint open ".02.
100,000	.10		
110,000	.14		
120,000	.17		
144,500			Ultimate strength.

Tore plate across four rivet holes, shearing one end rivet.

The plate failed at the commencement of fracture by parting the middle sections, which showed a granular appearance. Metal not drawn down. Two sections between rivets have silky appearance, with seam through middle. Metal drawn down.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	29,310
Tensile strain on net section of upper plate	60,210
Compressive strain on bearing surface of rivets	56,980
Shearing strain on rivets	63,770

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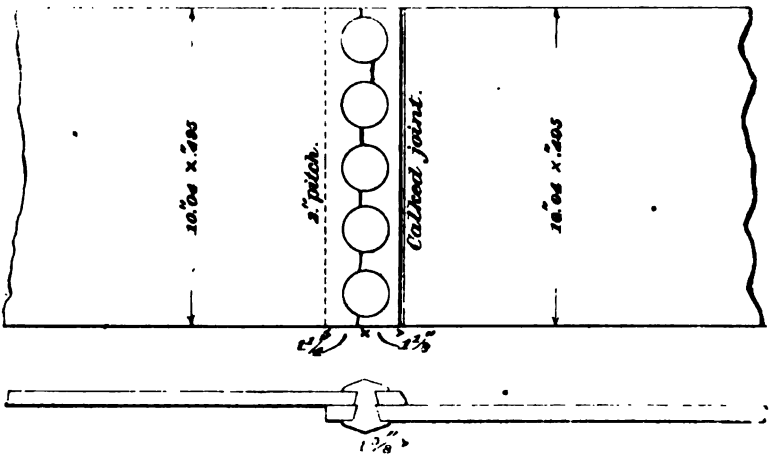
Fractured end of upper plate, Joint No. 294, showing granular and silky appearance in same metal.

No. 295.—½″ Steel Plate. Joint A. A . .



$\frac{15}{16}$″ iron rivets, "Burden's best."

Punched holes: Punch, 1″ diameter; die, $1\frac{1}{16}$″ diameter.

	Square inches.
Gross sectional area of plate	4.97
Net sectional area of plate	2.42
Bearing surface of rivets	2.55
Shearing area of rivets (1″ diameter)	3.93

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0005		
20,000	.0018		
30,000	.0038		
35,000	.0050		
5,000		.0010	
40,000	.0068		
45,000	.0088		
50,000	.0110		
55,000	.0130		
60,000	.0165		Joint opened perceptibly.
65,000	.0210		
70,000	.0248		
75,000	.0300		
80,000	.0360		Joint open ".01.
85,000	.0480		
90,000	.0625		
100,000	.10		Sharp snapping sound heard.
110,000	.14		Sharp snapping sound repeated at 104,500 pounds.
120,000			Ultimate strength.

Broke suddenly across rivet holes; appearance of fracture granular; no contraction.

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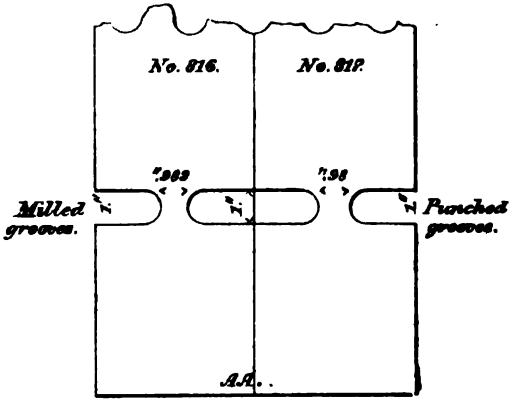
Maximum loads on joint.

	Pounds per sq. inch.
Tension strain on gross section of plate	24,145
Tension strain on net section of plate	49,590
Compression strain on bearing surface of rivets	47,060
Shearing strain on rivets	30,540

Photograph of fractured sections, upper plate, Joint No. 295. Granular fractures produced in the lap oint.



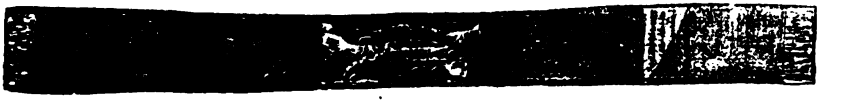
Specimens cut out of fractured plate A A . . No. 295. Tested by direct tension.

Sheet cut in two at middle.
One-half prepared with milled grooves.
One-half prepared with punched grooves.

No. 316.—MILLED SPECIMEN.

Sectional area, ″.982×″.495 = .486 square inch.
Ultimate strength, 32,850 pounds = 67,600 pounds per square inch.
Area at fracture, ″.88×″.33 = .290 square inch.
Contraction of area, 40.3 per cent.
Silky fracture; spongy line through center.

No. 317.—PUNCHED SPECIMEN.



Sectional area, ″.98×″.501 = .49 square inch.
Ultimate strength, 32,790 pounds = 66,920 pounds per square inch.
Area at fracture, ″.92×″.36 = .33 square inch.
Contraction of area, 32.7 per cent.
Appearance of fracture, silky, with slight granular appearance at center.

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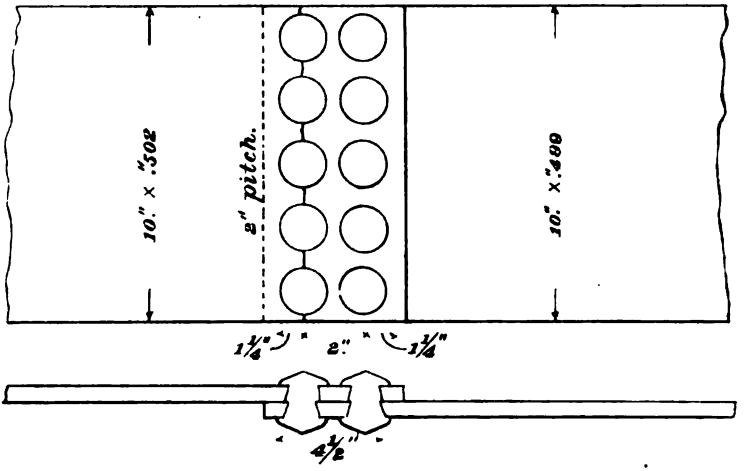
No. 619.—½″ Steel Plate. Plates C.



$\frac{15}{16}$″ iron rivets, "Burden's best."
Punched holes: Punch, 1″ diameter; die, $1\frac{3}{32}$″ diameter.

	Square inches.
Gross sectional area of upper plate	5.02
Net sectional area of upper plate	2.39
Bearing surface of rivets	5.26
Shearing area of rivets	7.85

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0005		
20,000	.0020		
30,000	.0040		
35,000	.0052		
5,000		.0019	
40,000	.0068		
45,000	.0080		
50,000	.0098		
5,000		.0045	
55,000	.0120		
60,000	.0140		
65,000	.0166		
70,000	.0190		
5,000		.0110	Micrometer removed.
75,000	.035		Elongations measured with dividers.
80,000	.035		
85,000	.04		
90,000	.05		
95,000	.05		
100,000	.06		
105,000	.06		
110,000	.07		
115,000	.07		
120,000	.07		
125,000	.08		
130,000	.085		
154,400			Ultimate strength.

Fractured upper plate across line of rivet holes.

Five of the fractured sections broke suddenly, with granular appearance and without contraction of area.

The sixth end section had silky appearance, the metal drawing down before breaking.

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Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	30,757
Tensile strain on net section of upper plate	64,602
Compressive strain on bearing surface of rivets	29,354
Shearing strain on rivets	19,670

No. 620.—½″ Steel Plate. Plates C . .

(Duplicate of C .)

Same style of joint as No. 619.
Upper plate, 10″ × ″.501.
Under plate, 10″ × ″.502.
$\frac{15}{16}$″ iron rivets, "Burden's best."
Punched holes: Punch, 1″ diameter; die, $1\frac{3}{32}$″ diameter.

	Square inches.
Gross sectional area of upper plate	5.01
Net sectional area of upper plate	2.39
Bearing surface of rivets	5.25
Shearing area of rivets	7.85

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0005		
20,000	.0018		
30,000	.0035		
35,000	.0048		
5,000		.0012	
40,000	.0060		
45,000	.0070		
50,000	.0089		
5,000		.0030	
55,000	.0108		
60,000	.0125		
65,000	.0148		
70,000	.0162		
5,000		.0090	
75,000	.0198		
80,000	.0230		
85,000	.0268		
90,000	.0305		
95,000	.0348		
100,000	.0390		
5,000		.0268	Micrometer removed.
105,000	.07—		
110,000	.07—		
115,000	.07—		
120,000	.07+		
130,000	.08		
140,000	.10		
150,000	.14		
154,200			Ultimate strength.

Fractured upper plate across line of rivet holes.
Broke suddenly, fractures granular. No contraction of area.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	30,778
Tensile strain on net section of upper plate	64,519
Compressive strain on bearing surface of rivets	29,371
Shearing strain on rivets	19,644

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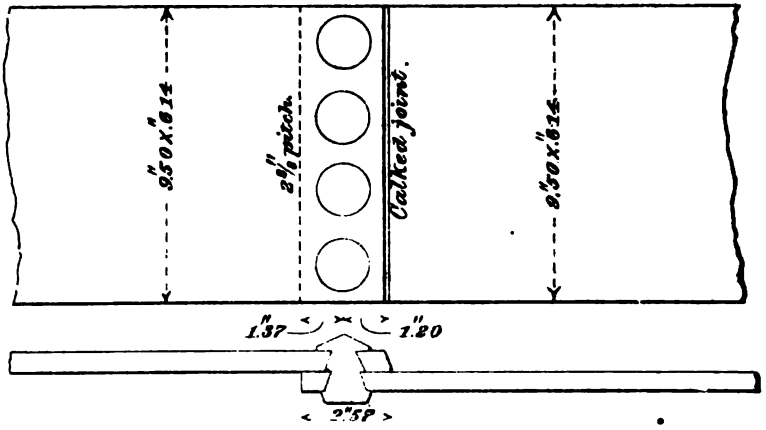
SINGLE AND DOUBLE RIVETED LAP JOINTS, $\frac{5}{8}$" STEEL PLATE.

No. 734.—$\frac{5}{8}$" STEEL PLATE. SET A.



1" steel rivets, hand-driven.
Punched holes: Punch, $1\frac{1}{16}$" diameter; die, $1\frac{5}{32}$" diameter.

	Square inches.
Gross sectional area of plate	5.83
Net sectional area of plate	3.11
Bearing surface of rivets	2.72
Shearing area of rivets	3.55

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0008		
20,000	.0018		
30,000	.0035		
40,000	.0068		
50,000	.0108		
60,000	.0160		
65,000	.0188		
70,000	.0225		
75,000	.0280		
80,000	.0348		
85,000	.0455		
90,000	.0600		
100,000	.09		
110,000	.14		
120,000	.17		
130,000	.22		Slight snapping sound at 132,000 pounds.
140,000			Ultimate strength.
154,400			

Sheared rivets.
Average elongation of rivet holes, ".15.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plate	26,480
Tensile strain on net section of plate	49,650
Compressive strain on bearing surface of rivets	56,760
Shearing strain on rivets	43,490

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No. 735.—⅝″ Steel Plate. Set A . .

Duplicate of A . No. 734.

Upper plate, 9″.50 × ″.617.
Under plate, 9″.50 × ″.613.
1″ steel rivets, hand-driven.
Punched holes: Punch, $1\frac{1}{16}$″ diameter; die, $1\frac{5}{8}$″ diameter.

	Square inches.
Gross sectional area of under plate	5.82
Net sectional area of under plate	3.10
Bearing surface of rivets	2.72
Shearing area of rivets	3.55

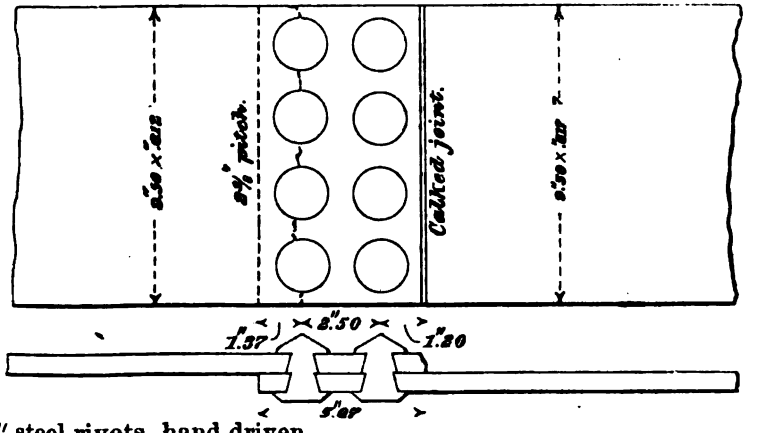
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0008		
20,000	.0018		
30,000	.0031		
35,000	.0040		
40,000	.0050		
45,000	.0066		
50,000	.0062		
55,000	.0105		
60,000	.0128		
65,000	.0152		
70,000	.0185		
75,000	.0220		
80,000	.0280		
85,000	.0370		
90,000	.0570		
100,000	.09		
110,000	.13		
140,000	.28		
163,000			Ultimate strength.

Sheared rivets.
Average elongation of rivet holes, ″.11.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of under plate	28,110
Tensile strain on net section of under plate	52,770
Compressive strain on bearing surface of rivets	60,150
Shearing strain on rivets	46,080

No. 736.—⅝″ Steel Plate. Set C .



1″ steel rivets, hand-driven.
Punched holes: Punch, $1\frac{1}{16}$″ diameter; die, $1\frac{5}{8}$″ diameter.

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	Square inches.
Gross sectional area of upper plate	5.81
Net sectional area of upper plate	3.10
Bearing surface of rivets	5.43
Shearing area of rivets	7.09

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0006		
20,000	.0018		
30,000	.0030		
40,000	.0058		
50,000	.0080		
60,000	.0120		
65,000	.0148		
70,000	.0175		
75,000	.0208		
80,000	.0240		
85,000	.0275		
90,000	.0309		
95,000	.0338		
100,000	.0370		
105,000	.0405		
110,000	.0440		
115,000	.0488		
120,000	.0540		
140,000	.08		
160,000	.14		
190,000	.29		
216,000			Ultimate strength.

Maximum loads on joint.

	Pounds per sq. inch
Tensile strain on gross section of upper plate	37,180
Tensile strain on net section of upper plate	69,680
Compressive strain on bearing surface of rivets	39,780
Shearing strain on rivets	30,470

No. 737.—$\frac{5}{8}$″ Steel Plate. Set C . .

Duplicate of C . No. 736.
Upper plate, 9″.50 × ″.612.
Under plate, 9″.50 × ″.616.
1″ steel rivets, hand-driven.
Punched holes: Punch, $1\frac{1}{16}$″ diameter; die, $1\frac{5}{32}$″ diameter.

	Square inches.
Gross sectional area of upper plate	5.81
Net sectional area of upper plate	3.10
Bearing surface of rivets	5.43
Shearing area of rivets	7.09

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0008		
20,000	.0021		
30,000	.0040		
40,000	.0068		
50,000	.0102		
60,000	.0150		
70,000	.0220		
80,000	.0280		
90,000	.0340		
100,000	.0420		
110,000	.0480		
130,000	.07		
160,000	.14		
175,000			Snapping sound heard.
208,000			Ultimate strength.

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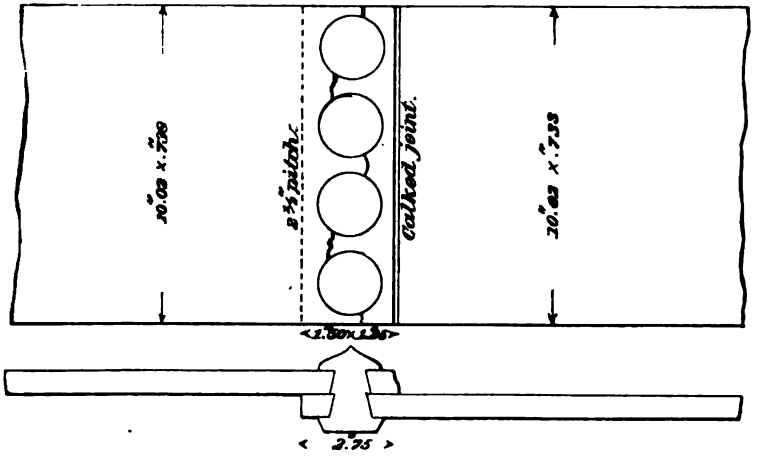
Fractured upper plate across line of rivet holes.
Fracture granular, radiating from rivet holes; metal not drawn down.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	35,800
Tensile strain on net section of upper plate	67,100
Compressive strain on bearing surface of rivets	38,300
Shearing strain on rivets	29,340

SINGLE AND DOUBLE RIVETED LAP JOINTS, ¼" STEEL PLATE.

No. 726.—¾" STEEL PLATE. SET A.



1⅛" steel rivets, hand-driven.
Punched holes: Punch, 1 3/16" diameter; die, 1 3/8 diameter.

	Square inches.
Gross sectional area of upper plate	7.39
Net sectional area of upper plate	3.75
Bearing surface of rivets	3.64
Shearing area of rivets	4.43

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0002		
20,000	.0009		
30,000	.0020		
40,000	.0038		
50,000	.0090		
55,000	.0120		
60,000	.0150		
65,000	.0185		
70,000	.0220		
75,000	.0255		
90,000	.05		
100,000	.06		
110,000	.09		
120,000	.14		
130,000	.16		Sharp snapping sound heard.
140,000	.21		
149,900			Ultimate strength.

Fractured upper plate. Appearance of fractures granular, radiating from rivet holes without contraction of area except end section *A*, which is silky, and metal well drawn down.
Broke suddenly with loud report.
Lower plate bent to an angle of about 11°.

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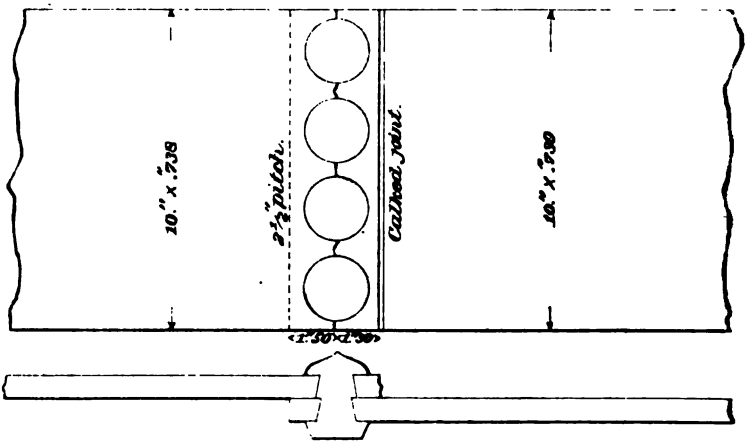
Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	20,280
Tensile strain on net section of upper plate	39,970
Compressive strain on bearing surface of rivets	41,180
Shearing strain on rivets	33,840

No. 727.—¾″ Steel Plate. Set A . .



1⅛″ steel rivets, hand-driven.
Punched holes: Punch, $1\frac{3}{16}$″ diameter; die, $1\frac{9}{32}$″ diameter.

	Square inches.
Gross sectional area of upper plate	7.38
Net sectional area of upper plate	3.73
Bearing surface of rivets	3.64
Shearing area of rivets	4.43

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0001		
20,000	.0010		
30,000	.0022		
35,000	.0030		
40,000	.0040		
45,000	.0052		
50,000	.0072		
55,000	.0100		
60,000	.0128		
65,000	.0160		
70,000	.0190		
75,000	.0225		
80,000	.0260		
85,000	.0310		
90,000	.0360		
95,000	.0415		
100,000	.0500		
110,000	.09		
120,000	.11		
130,000	.15		
140,000	.20		
176,700			Ultimate strength.

Fractured upper plate. Broke suddenly with loud report. Metal granular.
No contraction of area.

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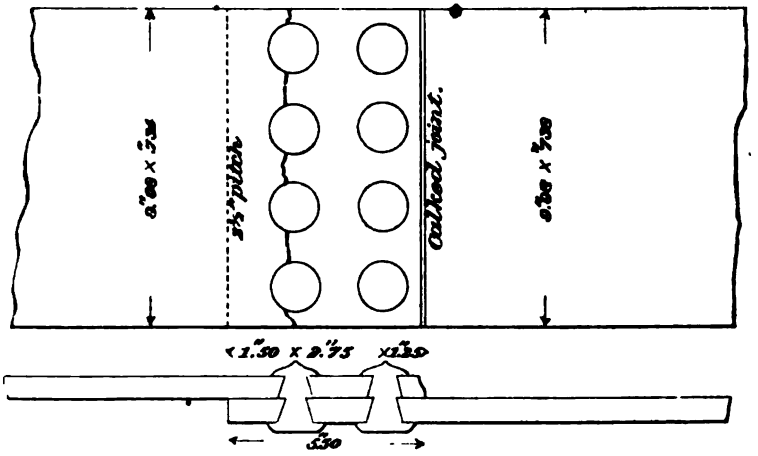
Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	23,940
Tensile strain on net section of upper plate	47,370
Compressive strain on bearing surface of rivets	48,540
Shearing strain on rivets	39,890

No. 728.—$\frac{3}{4}$″ Steel Plate. Set C.



1$\frac{1}{8}$″ steel rivets, hand-driven.
Punched holes: Punch, 1$\frac{3}{16}$″ diameter; die, 1$\frac{9}{32}$ diameter.

	Square inches.
Gross sectional area of upper plate	7.83
Net sectional area of upper plate	3.70
Bearing surface of rivets	7.25
Shearing area of rivets	8.86

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0002		
20,000	.0011		
30,000	.0025		
40,000	.0040		
50,000	.0052		
60,000	.0092		
65,000	.0116		
70,000	.0135		
75,000	.0160		
80,000	.0182		
85,000	.0208		
90,000	.0240		
95,000	.0268		Joint open ".01.
100,000	.0300		
120,000	.04		
140,000	.06		
160,000	.08		Snapping sound.
161,200			Ultimate strength.

Fractured upper plate, granular fractures radiating from rivet holes; hard appearance of metal next punched holes; metal not drawn down; exception, one end section has silky appearance, with metal well drawn down. Broke suddenly with loud report.

Lower plate bent about 5°.

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Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	24,720
Tensile strain on net section of upper plate	48,970
Compressive strain on bearing surface of rivets	24,990
Shearing strain on rivets	20,450

No. 729.—¾″ STEEL PLATE. SET C . .

Same style of joint as No. 728.
Upper plate, 10″ × ″.739.
Under plate, 10″ × ″.735.
1⅛″ steel rivets, hand-driven.
Punched holes: Punch, $1\frac{3}{16}$″ diameter; die, $1\frac{9}{32}$″ diameter.

	Square inches.
Gross sectional area of upper plate	7.39
Net sectional area of upper plate	3.74
Bearing surface of rivets	7.30
Shearing area of rivets	8.86

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0005		
20,000	.0018		
30,000	.0031		
40,000	.0050		
50,000	.0080		
55,000	.0102		
60,000	.0128		
65,000	.0150		
70,000	.0168		
75,000	.0188		
80,000	.0208		
85,000	.0230		
90,000	.0250		
95,000	.0280		
100,000	.0302		
120,000	.04		
140,000	.07		
160,000	.09		
177,700			Ultimate strength.

Fractured upper plate across row of rivet holes.

Fractures granular, radiating from rivet holes; four sections broke simultaneously; one end section broke last, at 170,000 pounds load; sharp snapping sound heard, the load falling slightly at the same time.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of upper plate	24,050
Tensile strain on net section of upper plate	47,510
Compressive strain on bearing surface of rivets	24,340
Shearing strain on rivets	20,060

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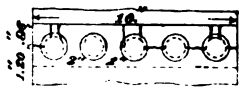
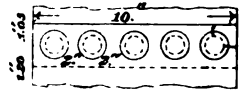
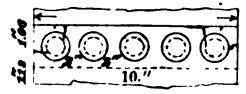
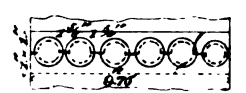
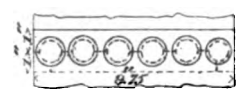
SINGLE-RIVETED LAP JOINTS, ¼″ IRON PLATE.

Number of test.	Distinguishing letter.	Style of joint.	Thickness of plate and kind of metal.	Size of rivets and kind of holes.	Sectional area of plate. Gross.	Sectional area of plate. Net.	Bearing surface of rivets.	Shearing area of rivets.	Tensile strength of metal.	Maximum strains on joint, pounds per square inch. Tension on gross area of plate.	Tension on net area of plate.	Compression on bearing surface of rivets.	Shearing on rivets.	Efficiency of joint.
					Sq. in.	*Sq. in.*	*Sq. in.*	*Sq. in.*	*Lbs. per sq. in.*					*Pr. ct.*
35	A.		¼″ iron.	⅝″ iron rivets ..... 1⅛″ punched holes ..	2.425	1.55	.88	1.92	47,925	27,630	**43,230**	**76,140**	**34,900**	57.7
36	A..		¼″ iron.	⅝″ iron rivets ..... 1⅛″ punched holes ..	2.52	1.63	.895	1.92	47,925	29,444	**45,520**	82,910	**38,640**	61.4
37	C.		¼″ iron.	⅝″ iron rivets ..... 1⅛″ drilled holes	2.58	1.69	.89	1.87	47,925	25,270	**38,580**	73,260	**34,870**	52.8
38	C..		¼″ iron	⅝″ iron rivets ..... 1⅛ drilled holes	2.64	1.73	.911	1.87	47,925	27,380	**41,790**	79,360	**38,660**	57.1
39	D.		¼″ iron.	⅝″ iron rivets ..... 1⅛″ punched holes ..	2.66	1.48	1.18	2.31	47,925	29,020	**52,160**	65,420	33,420	60.6
40	D..		¼″ iron.	⅝″ iron rivets ..... 1⅛″ punched holes ..	2.65	1.48	1.18	2.31	47,925	30,680	**54,930**	68,890	35,200	64.0

NOTE.—The figures in larger type indicate the manner of failure. When different kinds of fracture occurred in the same joint it is indicated by employing larger type in more than one column.

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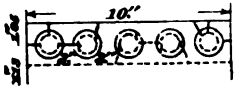
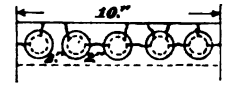
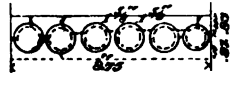
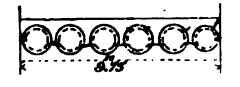
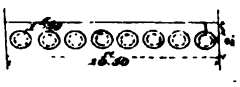
SINGLE-RIVETED LAP JOINTS, ¼″ IRON PLATE—Continued.

Number of test.	Distinguishing letter.	Style of joint.	Thickness of plate and kind of metal.	Size of rivets and kind of holes.	Sectional area of plate.		Bearing surface of rivets.	Shearing area of rivets.	Tensile strength of metal.	Maximum strains on joint, pounds per square inch.				Efficiency of joint.
					Gross.	Net.				Tension on gross area of plate.	Tension on net area of plate.	Compression on bearing surface of rivets.	Shearing on rivets.	
					Sq. in.	*Sq. in.*	*Sq. in.*	*Sq. in.*	*Lbs per sq. in.*					*Pr. ct.*
41	A A .		¼″ iron.	⅝″ steel rivets ..... ⅝″ punched holes ..	2.41	1.54	.868	1.92	47,925	31,580	49,420	87,670	39,640	65.9
42	A A ..		¼″ iron.	⅝″ steel rivets ..... ⅝″ punched holes ..	2.58	1.65	.929	1.92	47,925	30,220	47,260	83,949	40,610	63.1
43	D D .		¼″ iron	⅝″ steel rivets ..... ⅝″ punched holes ..	2.40	1.51	.886	1.53	47,925	28,875	45,890	78,220	45,300	60·3
44	D D..		¼″ iron.	⅝″ steel rivets ..... ⅝″ punched holes ..	2.36	1.49	.875	1.53	47,925	31,390	49,720	84,660	48,420	65.5
45	H .		¼″ iron.	⅞″ iron rivets ..... ⅞″ drilled holes	2.73	1.69	1.04	1.57	47,925	25,440	41,095	66,778	44,904	53.1
46	H . .		¼″ iron.	⅞″ iron rivets ..... ⅞″ drilled holes	2.85	1.76	1.084	1.57	47,925	23,158	37,500	60,886	42,038	48.3

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SINGLE-RIVETED LAP JOINTS, ¼" STEEL PLATE.

426	A.	3.6"	¼" steel	⅝" iron rivets..... ⅛" punched holes.	2.45	1.57	.882	1.92	55,765	29,690	46,340	82,480	**37,890**	53.2
427	A..		¼" steel	⅝" iron rivets..... ⅛" punched holes	2.47	1.58	.889	1.92	55,765	29,430	46,010	81,780	**37,860**	52.8
436	AA.	2.0"	¼" steel	⅝" steel rivets ... ⅛" punched holes.	2.45	1.57	.882	1.92	55,765	38,610	60,250	**107,280**	49,270	69.2
437	AA..		¼" steel	⅝" steel rivets..... ⅛" punched holes	2.47	1.58	.889	1.92	55,765	37,895	59,240	**105,290**	48,750	68.0
428	C.	1.6"	¼" steel	⅝" iron rivets..... ⅛" drilled holes...	2.53	1.66	.873	1.87	55,765	26,870	40,950	77,870	**36,350**	48.2
429	C..		¼" steel	⅝" iron rivets..... ⅛" drilled holes...	2.48	1.62	.856	1.87	55,765	27,680	42,370	80,200	**36,710**	49.6
438	CC.	1.0"	¼" steel	⅝" steel rivets..... ⅛" drilled holes...	2.53	1.66	.873	1.87	55,765	41,460	**63,190**	120,160	56,100	74.3
439	CC..		¼" steel	⅝" steel rivets..... ⅛" drilled holes...	2.45	1.60	.845	1.87	55,765	40,040	**61,310**	116,090	52,460	71.8
430	E.	5.75	¼" steel	⅝" steel rivets..... ⅛" drilled holes...	2.44	1.40	1.04	2.24	55,765	38,360	**66,860**	90,000	41,790	68.8
431	E..		¼" steel	⅝" steel rivets..... ⅛" drilled holes...	2.44	1.40	1.04	2.24	55,765	40,160	**70,000**	94,230	43,750	72.0
47	H.	10⅛"	¼" steel	⅞" steel rivets.... ⅛" drilled holes....	2.66	1.64	1.012	1.57	55,765	38,496	62,496	101,180	**65,220**	69.0

NOTE.—The figures in larger type indicate the manner of failure. When different kinds of fracture occurred in the same joint it is indicated by employing larger type in more than one column.

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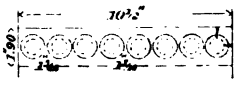
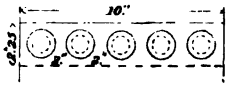
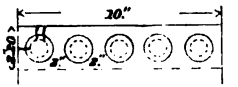
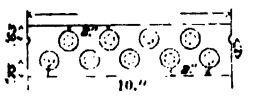
SINGLE-RIVETED LAP JOINTS, ¼″ IRON PLATE—Continued.

Number of test.	Distinguishing letter.	Style of joint.	Thickness of plate and kind of metal.	Size of rivets and kind of holes.	Sectional area of plate. Gross.	Sectional area of plate. Net.	Bearing surface of rivets.	Shearing area of rivets.	Tensile strength of metal.	Maximum strains on joint, pounds per square inch. Tension on gross area of plate.	Tension on net area of plate.	Compression on bearing surface of rivets.	Shearing on rivets.	Efficiency of joint.
					Sq.in.	*Sq.in.*	*Sq.in.*	*Sq.in.*	*Lbs. per sq. in.*					*Pr. ct.*
48	H . .		¼″ steel	⅞″ steel rivets .... ⅞″ drilled holes....	2.625	1.623	1.00	1.57	55,765	36,114	58,338	94,800	**60,382**	64.8
49	CCC.		¼″ steel	⅞ steel rivets.... 1⅛″ drilled holes...	2.49	1.63	.856	1.86	55,765	39,400	60,184	114,603	**52,742**	70.6
50	CCC..		¼″ steel	⅞″ steel rivets .... 1⅛″ drilled holes...	2.50	1.64	.859	1.86	55,765	3 680	57,439	109,650	**50,645**	67.8

DOUBLE-RIVETED LAP JOINTS, ¼″ IRON AND STEEL PLATE.

85	I .		¼″ iron.	⅞″ iron rivets ..... ⅞″ drilled holes	2.64	1.98	1.19	1.77	47,925	28,900	38,535	64,120	**43,110**	60.3

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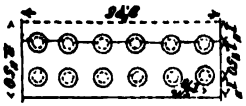
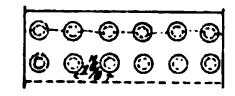
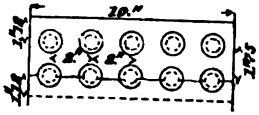
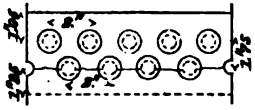
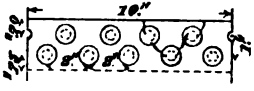
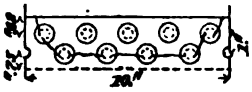
86	I . .		⅜″ iron	⅞″ iron rivets ..... ⅞″ drilled holes ..	2.30	1.77	1.06	1.77	47,925	31,314	**41,750**	**69,710**	**41,750**	65.3
617	K .		⅜″ iron.	⅞″ iron rivets ..... ⅞″ punched holes ..	2.71	1.69	2.03	2.98	47,925	31,550	**50,592**	42,118	28,691	65.8
618	K . .		⅜″ iron	⅞″ iron rivets ..... ⅞″ punched holes ..	2.73	1.71	2.05	2.98	47,925	31,282	**49,950**	41,660	28,660	65.3
432	F .		⅜″ steel	⅞″ iron rivets ..... 1⅛″ punched holes ..	2.49	1.59	1.79	3.85	55,765	39,280	**61,510**	54,640	25,400	70.4
433	F . .		⅜″ steel	⅞″ iron rivets ..... 1⅛″ punched holes ..	2.54	1.63	1.83	3.85	55,765	38,700	**60,300**	53,715	25,530	69.4
434	G .		⅜″ steel	⅞″ iron rivets ..... 1⅛″ punched holes .	2.52	1.61	1.63	3.46	55,765	41,785	**65,460**	64,600	30,430	74.9
435	G . .		⅜″ steel	⅞″ iron rivets ..... 1⅛″ punched holes ..	2.54	1.63	1.66	3.46	55,765	41,460	**64,600**	63,430	30,430	74.3
87	I .		⅜″ steel	⅞″ steel rivets..... ⅞″ drilled holes	2.41	1.80	1.08	1.77	55,765	42,530	56,944	**94,910**	**57,910**	76.3
88	I . .		⅜″ steel	⅞″ steel rivets..... ⅞″ drilled holes	2.44	1.83	1.10	1.77	55,765	44,344	**59,130**	98,360	61,130	79.5

NOTE.—The figures in larger type indicate the manner of failure. When different kinds of fracture occurred in the same joint, it is indicated by employing larger type in more than one column.

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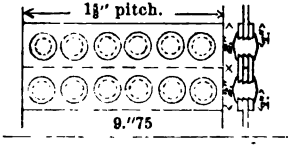
DOUBLE-WELT BUTT JOINTS ¼" IRON PLATE.

Number of test.	Distinguishing letter.	Style of joint.	Size of rivets and kind of holes.	Sectional area of plate.		Bearing surface of rivets.	Shearing area of rivets.	Tensile strength of metal.	Maximum strains on joint, pounds per square inch.*				Efficiency of joint.
				Gross.	Net.				Tension on gross area of plate.	Tension on net area of plate.	Compression on bearing surface of rivets.	Shearing on rivets.	
				Sq. inch.	*Sq. inch.*	*Sq. inch.*	*Sq. inch.*	*Lbs. per sq. inch.*					*Pr. ct.*
615	L.		⅞" iron rivets. 1⅛" punched holes.....	2.53	1.41	1.12	4.45	47,925	29,800	**53,475**	67,321	16,944	62.2
616	L..		.....do.....do.....	2.62	1.46	1.16	4.45	47,925	28,397	**50,959**	64,138	16,719	59.3

NOTE.—The figures in larger type indicate the manner of failure. When different kinds of fracture occurred in the same joint, it is indicated by employing larger type in more than one column.

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SINGLE-RIVETED LAP JOINTS, ⅜″ IRON PLATE.

Number of test.	Distinguishing letter.	Style of joint.	Thickness of plate and kind of metal.	Size of rivets and kind of holes.	Sectional area of plate. Gross.	Sectional area of plate. Net.	Bearing surface of rivets.	Shearing area of rivets.	Tensile strength of metal.	Maximum strains on joint, pounds per square inch.* Tension on gross area of plate.	Tension on net area of plate.	Compression on bearing surface of rivets.	Shearing on rivets.	Efficiency of joint.
					Sq.in.	*Sq.in.*	*Sq.in.*	*Sq.in.*	*Lbs.per sq. in.*					*Pr. ct.*
62	A.	2⅛ 2⅛ 2⅛ 10.″	⅜″ iron.	1⅛″ iron rivets ..... ¾″ punched holes ...	3.76	2.32	1.44	2.27	47,180	23 110	37,460	**60,340**	**38,280**	49.0
63	A..	2⅛ 2⅛ 2⅛ 10.″	⅜″ iron.	1⅛″ iron rivets ..... ¾″ punched holes ...	3.81	2.35	1.46	2.39	47,180	22,280	**36,130**	**58,150**	35,520	47.2
64	C.	2.30 10.″	⅜″ iron.	1⅛″ iron rivets ..... ¾″ drilled holes	3.73	2.29	1.44	2.33	47,180	23,445	38,190	60,730	**37,530**	49.7
65	C..	2.30 10.″	⅜″ iron	1⅛″ iron rivets ..... ¾″ drilled holes	3.78	2.32	1.46	2.33	47,180	22,220	36,210	57 530	**36,050**	47.1
66	D.	2⅛ 10⅜″	⅜″ iron.	1⅛″ iron rivets ..... ¾″ punched holes ..	3.95	2.23	1.42	2.72	47,180	23,570	**41,750**	54,130	34,230	50.0
67	D..	2⅛ 10⅜″	⅜″ iron.	1⅛″ iron rivets ..... ¾″ punched holes ...	3.99	2.25	1.74	2.72	47,180	23,280	**41,290**	53,400	34,150	49.8
720	K.	2 1/16″ pitch.	⅜″ iron.	1″ iron rivets ..... 1 1/16″ punched holes..	4.07	1.88	2.19	4.43	47,180	28,500	**61,700**	52,970	26,180	60.4
721	K..	1⅝ 1⅝ 10.″33	⅜″ iron.	1″ iron rivets ..... 1 1/16″ punched holes .	4.08	1.88	2.19	4.43	47,180	26,960	**58,510**	50,229	24,830	57.1

NOTE.—The figures in larger type indicate the manner of failure. When different kinds of fracture occurred in the same joint, it is indicated by employing larger type in more than one column.

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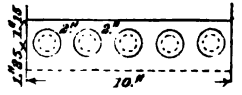
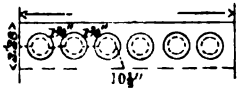
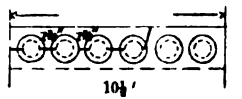
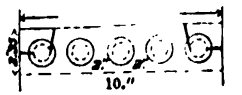
SINGLE-RIVETED LAP JOINTS, ⅜″ STEEL PLATE.

Number of test.	Distinguishing letter.	Style of joint.	Thickness of plate and kind of metal.	Size of rivets and kind of holes.	Sectional area of plate. Gross.	Sectional area of plate. Net.	Bearing surface of rivets.	Shearing area of rivets.	Tensile strength of metal.	Maximum strains on joint, pounds per square inch. Tension on gross area of plate.	Tension on net area of plate.	Compression on bearing surface of rivets.	Shearing on rivets.	Efficiency of joint.
					Sq.in.	*Sq.in.*	*Sq.in.*	*Sq.in.*	*Lbs. per sq. in.*					*Pr. et.*
51	A.		⅜″ steel	⅞″ iron rivets ⅝″ punched holes	3.73	2.30	1.427	2.27	53,330	24,180	39,220	63,210	**39,740**	45.4
52	A..		⅜″ steel	⅞″ iron rivets ⅝″ punched holes	3.73	2.30	1.427	2.27	53,330	23,240	37,700	60,760	**38,190**	43.6
53	AA.		⅜″ steel	⅞″ steel rivets ⅝″ punched holes	3.75	2.32	1.43	2.27	53,330	34,160	55,215	**89,580**	**56,430**	64.1
54	AA..		⅜″ steel	⅞″ steel rivets ⅝″ punched holes	3.72	2.30	1.42	2.27	53,330	33,840	54,740	**88,660**	**55,460**	63.5
55	E.		⅜″ steel	⅞″ steel rivets ⅝″ drilled holes	3.97	2.22	1.746	2.79	53,330	35,590	**63,650**	80,930	**50,650**	66.7
56	E..		⅜″ steel	⅞″ steel rivets ⅝″ drilled holes	3.96	2.22	1.74	2.79	53,330	35,860	**63,976**	81,600	**50,900**	67.2
238	CC.		⅜″ steel	⅞″ steel rivets ⅝″ punched holes	3.74	2.16	1.58	2.64	53,330	37,810	65,460	**89,490**	**53,560**	70.9

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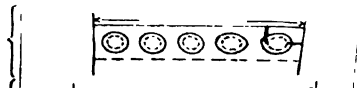
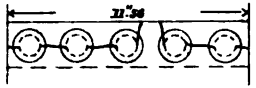
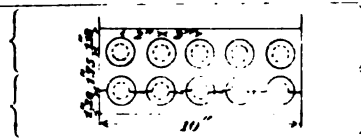
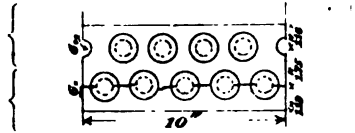
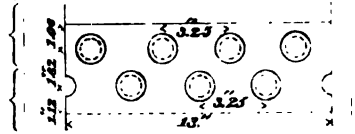
289	C C . .		⅜″ steel	⅝″ steel rivets ⅝″ punched holes	3.76	2.17	1.59	2.64	53,330	37,630	65,210	88,990	53,600	70.6
718	K .		⅜″ steel	1″ iron rivets 1⅛″ punched holes	4.26	2.21	2.04	4.43	53,330	38,075	73,394	79,510	36,614	71.4
719	K . .		⅜″ steel	1″ iron rivets 1⅛″ punched holes	4.22	2.19	2.02	4.43	53,330	38,390	73,970	80,200	36,590	72.0

DOUBLE RIVETED LAP JOINTS, ⅜″ IRON AND STEEL PLATE.

68	F .		⅜″ iron	1⅛″ iron rivets ¾″ punched holes	3.75	2.32	2.87	4.54	47,180	29,970	48,450	39,160	24,760	63.5
69	F . .		⅜″ iron	1⅛″ iron rivets ¾″ punched holes	3.79	2.34	2.89	4.54	47,180	31,320	50,730	41,070	26,150	66.4
58	F . . .		⅜″ iron	1⅛″ iron rivets ¾″ punched holes	3.71	2.29	2.83	4.54	47,180	31,000	50,320	40,040	25,330	65.7
70	G .		⅜″ iron	1⅛″ iron rivets ¾″ punched holes	3.94	2.43	2.71	4.08	47,180	28,530	46,255	41,480	27,550	60.5
71	G . .		⅜″ iron	1⅛″ iron rivets ¾″ punched holes	3.87	2.39	2.67	4.08	47,180	28,475	46,110	41,270	27,010	60.4
81	I .		⅜″ iron	1⅛″ iron rivets ¾″ drilled holes	5.09	3.91	2.06	3.08	47,180	23,750	30,920	58,700	39,130	50.4
82	I . .		⅜″ iron	1⅛″ iron rivets ¾″ drilled holes	5.12	3.94	2.07	3.09	47,180	23,180	30,130	57,340	38,410	49.1

NOTE.—The figures in larger type indicate the manner of failure. When different kinds of fracture occurred in the same joint, it is indicated by employing larger type in ore than one column.

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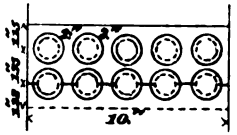
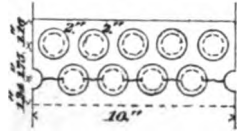
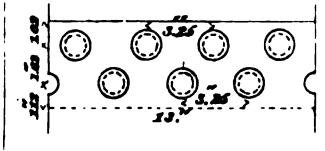
DOUBLE-RIVETED LAP JOINTS, ⅜″ IRON AND STEEL PLATE—Continued.

Number of tests.	Distinguishing letter.	Style of joint.	Thickness of plate and kind of metal.	Size of rivets and kind of holes.	Sectional area of plate. Gross.	Sectional area of plate. Net.	Bearing surface of rivets.	Shearing area of rivets.	Tensile strength of metal.	Maximum strains on joint, pounds per square inch. Tension on gross area of plate.	Tension on net area of plate.	Compression on bearing surface of rivets.	Shearing on rivets.	Efficiency of joint.
					Sq. in.	*Sq. in*	*Sq. in.*	*Sq. in.*	*Lbs. per sq. in.*					*Pr. ct.*
57	F.		⅜″ steel.	1⅛″ iron rivets ⅝″ punched holes	3.76	2.32	2.89	4.54	53,330	39,020	**62,800**	50,760	32,310	73.2
59	F..		⅜″ steel.	1⅛″ iron rivets ⅝″ punched holes	3.73	2.31	2.85	4.54	53,330	40,080	**64,720**	52,450	32,930	75.2
60	G.		⅜″ steel.	1⅛″ iron rivets ⅝″ punched holes	3.63	2.24	2.49	4.08	53,330	39,010	**63,210**	56,860	34,710	73.2
61	G..		⅜″ steel.	1⅛″ iron rivets ⅝″ punched holes	3.70	2.29	2.54	4.08	53,330	34,000	**54,930**	49,530	30,830	63.8
83	I.		⅜″ steel.	1⅛″ steel rivets ⅝″ drilled holes	4.75	3.65	1.93	3.09	53,330	34,316	44,660	84,460	**52,750**	64.4
84	I..		⅜″ steel.	1⅛″ steel rivets ⅝″ drilled holes	4.77	3.67	1.93	3.09	53,330	33,585	43,650	83,000	**51,845**	63.0

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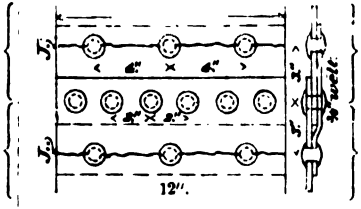
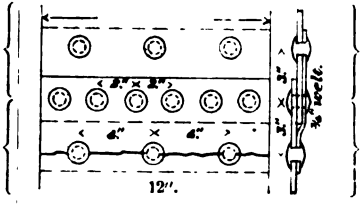
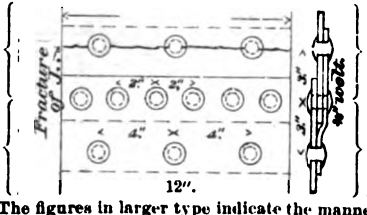
244	J .		⅜″ iron.	⅞″ iron rivets .72 drilled holes	4.63	3.80	2.50	3.66	47,180	31,900	**38,870**	59,080	**40,360**	67.6
245	J . .		⅜″ iron.	⅞″ iron rivets ⅞″ drilled holes	4.69	3.74	2.89	4.75	47,180	34,900	**43,770**	56,640	34,460	74.0
296	J J .		⅜″ iron.	⅞″ iron rivets ⅞″ drilled holes	4.51	3.59	2.78	4.75	47,180	35,700	**44,840**	57,910	33,890	75.7
297	J J . .		⅜″ iron.	⅞″ iron rivets ⅞″ drilled holes	4.45	3.54	2.73	4.75	47,180	33,950	**42,680**	55,350	31,810	71.9
246	J .		⅜″ steel	⅞″ steel rivets ⅞″ drilled holes	4.34	3.32	3.06	6.25	53,330	47,465	**62,050**	67,320	32,960	89.0
247	J . .		⅜″ steel	⅞″ steel rivets ⅞″ drilled holes	4.41	3.37	3.11	6.25	53,330	48,050	**62,880**	68,135	33,900	90.1

NOTE.—The figures in larger type indicate the manner of failure. When different kinds of fracture occurred in the same joint, it is indicated by employing larger type in more than one column.

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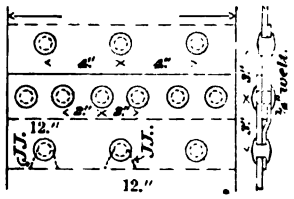
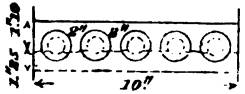
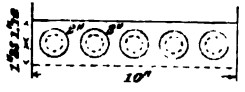
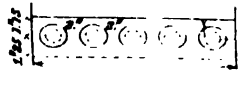
RIVETED JOINTS, ⅜″ IRON AND STEEL PLATE REINFORCED LAP JOINTS—Continued.

Number of tests.	Distinguishing letter.	Style of joint.	Thickness of plate and kind of metal.	Size of rivets and kind of holes.	Sectional area of plate.		Bearing surface of rivets.	Shearing area of rivets.	Tensile strength of metal.	Maximum strains on joint, pounds per square inch.				Efficiency of joint.
					Gross.	Net.				Tension on gross area of plate.	Tension on net area of plate.	Compression on bearing surface of rivets.	Shearing on rivets.	
					Sq. in.	*Sq. in.*	*Sq. in.*	*Sq. in.*	*Lbs. per sq. in.*					*Pr. ct.*
298	J J.		⅜″ steel	⅞″ iron rivets ..... ⅞″ drilled holes ..	4.47	3.43	3.11	6.11	53,330	46,820	61,020	**67,300**	**34,250**	87.8
299	J J..		⅜″ steel	⅞″ iron rivets ..... ⅞″ drilled holes ..	4.48	3.44	3.12	6.11	53,330	47,390	61,710	**68,040**	**34,750**	88.9

SINGLE-RIVETED LAP JOINTS, ⅜″ IRON AND STEEL PLATE.

240	A.		⅜″ iron.	¾″ iron rivets .... ⅞″ punched holes.	5.095	2.91	2.18	2.64	44,615	17,760	**31,100**	41,500	34,280	39.8
241	A..		⅜″ iron.	¾″ iron rivets .... ⅞″ punched holes.	5.14	2.94	2.20	2.64	44,615	17,690	**31,395**	41,955	34,960	39.7
292	A A.		⅜″ iron.	¾″ iron rivets .... ⅞″ drilled holes...	5.08	3.03	2.05	2.58	44,615	19,130	32,376	47,850	**38,020**	42.9
293	A A..		⅜″ iron.	¾″ iron rivets ... ⅞″ drilled holes...	5.12	3.05	2.07	2.58	44,615	19,765	33,180	48,890	**39,220**	44.3
327	A A A.		⅜″ iron	¾″ steel rivets ... ⅞″ drilled holes.	5.11	3.04	2.06	2.58	44,615	28,740	39,900	**58,880**	**47,020**	52.2

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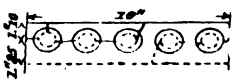
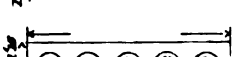
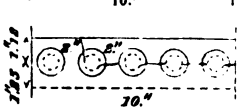
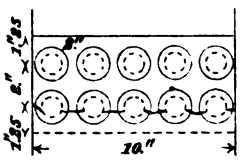
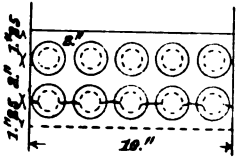
326	A A A . .		⅜″ iron	⅞″ steel rivets ..... ⅞″ drilled holes . . .	5.10	3.04	2.06	2.58	44,615	24,200	**40,590**	**59,900**	47,830	54.2
242	A .		⅜″ steel	¾″ iron rivets ..... ⅞″ punched holes	4.97	2.84	2.13	2.64	57,215	21,830	38,204	50,940	**41,100**	38.2
243	A . .		⅜″ steel	¾″ iron rivets ..... ⅞″ punched holes	4.97	2.84	2.13	2.64	57,215	20,523	35,915	47,890	**38,636**	35.9
294	A A .		⅜″ steel	⅝″ iron rivets .... 1″ punched holes .	4.93	2.40	2.536	3.93	57,215	20,310	**60,210**	56,980	**36,770**	51.2
295	A A . .		⅜″ steel	⅝″ iron rivets .. 1″ punched holes .	4.97	2.42	2.55	3.93	57,215	24,145	**49,590**	47,060	30,540	42.2

DOUBLE-RIVETED LAP JOINTS, ⅜″ IRON AND STEEL PLATE.

329	C .		⅜″ iron	¾″ iron rivets ..... ⅞″ punched holes	5.16	2.96	2.20	5.19	44,615	25,430	44,320	59,040	25,280	57.0
635	C . .		⅜″ iron	¾″ iron rivets ..... ⅞″ punched holes.	5.17	2.97	2.20	5.19	44,615	24,660	42,920	57,950	24,560	55.2
619	C .		⅜″ steel	⅛ iron rivets .... 1″ punched holes .	5.02	2.39	5.26	7.85	57,215	30,757	**64,602**	29,354	19,670	53.8
620	C . .		⅜″ steel	⅛ iron rivets ..... 1″ punched holes..	5.01	2.39	5.25	7.85	57,215	30,778	**64,519**	29,371	19,644	53.8

NOTE.—The figures in larger type indicate the manner of failure. When different kinds of fracture occurred in the same joint, it is indicated by employing larger type in more than one column.

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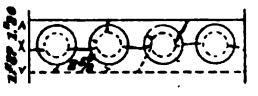
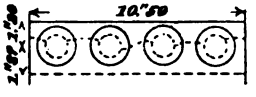
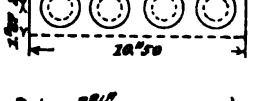
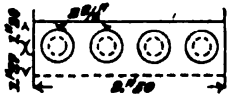
SINGLE AND DOUBLE RIVETED LAP JOINTS, ⅜″ IRON PLATE.

Number of test.	Distinguishing letter.	Style of joint.	Size of rivets and kind of holes.	Sectional area of plate. Gross.	Sectional area of plate. Net.	Bearing surface of rivets.	Shearing area of rivets.	Tensile strength of metal.	Maximum strains on joint, pounds per square inch. Tension on gross area of plate.	Tension on net area of plate.	Compression on bearing surface of rivets.	Shearing on rivets.	Efficiency of joint.
				Sq. in.	*Sq. in.*	*Sq. in.*	*Sq. in.*	*Lbs. per sq. in.*					*Pr. ct.*
730	A.		1″ iron rivets 1 1/16″ punched holes	6.29	3.63	2.65	3.55	44,635	20,020	**34,680**	47,510	35,460	44.9
731	A..		1″ iron rivets 1 1/16″ punched holes	6.28	3.62	2.65	3.55	44,635	19,750	**34,230**	46,790	34,930	42.0
732	C.		1″ iron rivets 1 1/16″ punched holes	6.48	3.74	5.48	7.09	44,635	25,150	**43,580**	29,740	22,990	56.3
733	C..		1″ iron rivets 1 1/16″ punched holes	6.34	3.66	5.36	7.09	44,635	26,470	**45,850**	31,310	23,670	59.3
734	A.		1″ steel rivets 1 1/16″ punched holes	5.83	3.11	2.72	3.55	52,445	26,480	49,650	56,760	**43,490**	50.5

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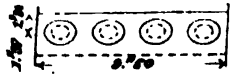
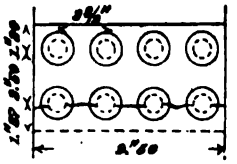
736	A . .		1″ steel rivets 1 1/16″ punched holes	6.82	3.10	2.72	3.55	52,445	28,110	52,770	60,150	46,080	88.6
736	C .		1″ steel rivets 1 1/16″ punched holes	5.81	3.10	5.43	7.09	52,445	37,180	**69,680**	39,780	30,470	76.9
737	C . .		1″ steel rivets 1 1/16″ punched holes	5.81	3.10	5.43	7.09	52,445	35,800	**67,100**	38,300	29,340	68.3

NOTE.—The figures in larger type indicate the manner of failure. When different kinds of fracture occurred in the same joint, it is indicated by employing larger type in more than one column.

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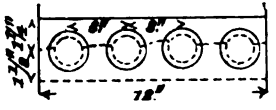
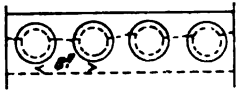
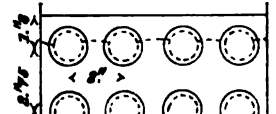
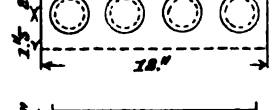
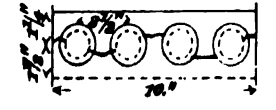
SINGLE AND DOUBLE RIVETED LAP JOINTS, ¾″ IRON AND STEEL PLATE.

Number of test.	Distinguishing letter.	Style of joint.	Thickness of plate and kind of metal.	Size of rivets and kind of holes.	Sectional area of plate. Gross.	Sectional area of plate. Net.	Bearing surface of rivets.	Shearing area of rivets.	Tensile strength of metal.	Maximum strains on joint, pounds per square inch. Tension on gross area of plate.	Tension on net area of plate.	Compression on bearing surface of rivets.	Shearing on rivets.	Efficiency of joint.
					Sq.in.	*Sq.in.*	*Sq.in.*	*Sq.in.*	*Lbs. per sq. in.*					*Pr. ct.*
722	A.		¾″ iron	1⅛″ iron rivets 1 3/16″ punched holes	8.38	4.93	3.44	4.43	46,590	17,230	29,290	41,980	32,600	37.0
723	A..		¾″ iron	1⅛″ iron rivets 1 3/16″ punched holes	8.38	4.93	3.44	4.43	46,590	18,080	30,730	44,040	34,200	38.8
724	C.		¾″ iron	1⅛″ iron rivets 1 3/16″ punched holes	8.41	4.95	6.92	8.86	46,590	24,720	42,000	30,040	23,460	53.1
725	C..		¾″ iron	1⅛″ iron rivets 1 3/16″ punched holes	8.17	4.81	6.72	8.86	46,590	25,870	43,950	31,460	23,800	55.5
726	A.		¾″ steel	1⅛″ steel rivets 1 3/16″ punched holes	7.39	3.75	3.64	4.43	51,545	20,280	39,970	41,180	33,840	39.3

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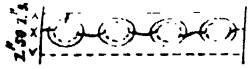
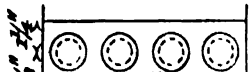
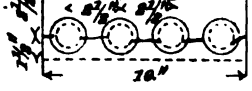
727	A . .		⅜″ steel .	1⅛″ steel rivets 1 13/16″ punched holes	7.38	3.78	3.64	4.48	51,545	28,940	47,870	48,540	39,890	46.4
728	C .		¾″ steel . . .	1⅛″ steel rivets 1 13/16″ punched holes	7.33	3.70	7.25	8.86	51,545	24,720	48,970	24,990	20,450	48.0
729	C . .		¾″ steel . . .	1⅛″ steel rivets 1 13/16″ punched holes	7.39	3.74	7.30	8.86	51,545	24,050	47,510	24,340	20,060	46.7

NOTE.—The figures in larger type indicate the manner of failure. When different kinds of fracture occurred in the same joint, it is indicated by employing larger type in more than one column.

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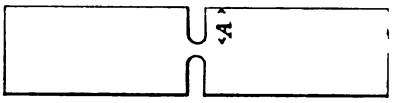
Tensile tests of ¼″ iron and steel grooved specimens.

To determine the effect upon the tensile strength of the metal, of grooves, punched and drilled, varying in diameter, also varying the width of the specimens at the bottom of the grooves.

FORM OF SPECIMENS.



Each specimen reinforced by the same width of metal, $A=1''.10$, from the bottom of the groove to the side of the plate.

Diameters of drilled grooves: ¼″, ½″, ¾″, 1″.

Diameters of punched grooves: Punch $\frac{9}{16}''$, die $\frac{5}{8}''$; punch ¾″, die die $\frac{13}{16}''$; punch 1″, die $1\frac{1}{16}''$.

Tensile tests of ¼″ grooved specimen wrought iron.

Number.	Plate.	Diameter of groove.	Width at bottom of groove.	Thickness of plate.	Sectional area.	Ultimate strength.		Remarks.
						Actual pounds.	Pounds per sq. inch.	
		Inch.	*Inch.*	*Inch.*	*Sq. in.*			
92	Punched..	$\frac{5}{16}$	.48	.240	.115	5,530	48,090	
93	....do	$\frac{5}{16}$	.46	.235	.108	5,070	46,940	
94	... do	$\frac{5}{16}$	.46	.241	.111	5,470	49,280	
95	... do	$\frac{5}{16}$	.49	.240	.118	6,530	55,340	
96	....do	1	.44	.239	.105	5,410	51,520	
97	....do	1	.47	.241	.113	5,640	49,910	
98	... do	$\frac{5}{16}$	.97	.247	.240	11,890	49,540	
99	....do	$\frac{5}{16}$	.98	.247	.242	12,090	49,960	
100	... do	¼	.94	.249	.234	11,730	50,128	
101	....do	¼	.96	.248	.238	11,160	46,900	
102	....do	1	.98	.250	.245	11,510	46,980	
103	....do	1	.96	.251	.241	11,170	46,350	
104	....do	$\frac{5}{16}$	1.47	.250	.368	13,850	37,636	
105	... do	$\frac{5}{16}$	1.50	.252	.378	14,110	37,326	
106	....do	¼	1.48	.249	.369	15,140	41,030	
107	....do	¼	1.48	.247	.366	14,450	39,480	
108	....do	1	1.47	.250	.368	13,780	37,446	
109	....do	1	1.45	.251	.364	14,390	39,533	
110	....do	$\frac{5}{16}$	1.96	.281	.551	23,800	43,194	
111	....do	$\frac{5}{16}$	1.95	.274	.534	25,360	47,490	
112	....do	¼	1.95	.282	.550	22,750	41,360	
113	....do	¼	1.92	.279	.536	23,090	43,080	
114	....do	1	2.03	.250	.508	20,900	41,140	
115	....do	1	1.99	.248	.494	19,550	39,575	
116	....do	$\frac{5}{16}$	2.42	.280	.678	24,550	36,210	
117	....do	$\frac{5}{16}$	2.40	.245	.588	24,840	42,245	
118	....do	¼	2.47	.243	.600	25,340	42,233	
119	....do	¼	2.46	.285	.601	25,670	42,712	
120	....do	1	2.48	.245	.608	23,180	38,125	
121	....do	1	2.44	.248	.605	25,180	41,620	
122	....do	$\frac{5}{16}$	2.97	.247	.734	28,600	38,964	
123	....do	$\frac{5}{16}$	2.98	.241	.718	29,800	41,540	
124	....do	¼	2.96	.241	.713	28,500	39,972	
125	... do	¼	2.92	.240	.701	29,240	41,712	
126	... do	1	2.98	.250	.745	30,120	40,430	
127	....do	1	2.95	.247	.729	29,780	40,850	

REMARKS.—The iron plates with punched and drilled grooves show that fractures began at the sides of the grooves for those specimens having a width of 1½″, and wider before the metal separated at the middle of the specimen.

Fractures fibrous.

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Tensile tests of ¼″ grooved specimen wrought iron.

Number.	Plate.	Diameter of groove.	Width at bottom of groove.	Thickness of plate.	Sectional area.	Ultimate strength. Actual pounds.	Ultimate strength. Pounds per sq. inch.	Remarks.
		Inch	*Inch.*	*Inch.*	*Sq. in.*			
128	Drilled ...	¼	.51	.249	.127	7,085	55,787	
129	....do	¼	.52	.245	.127	7,100	55,905	
130	.. do	¼	.52	.275	.143	8,220	57,480	
131	.. do	¼	.52	.276	.144	8,060	56,000	
132	....do	¼	.49	.248	.122	6,050	49,600	
133	....do	¼	.50	.248	.124	7,030	56,700	
134	....do	1	.47	.275	.129	7,080	54,880	
135	....do	1	.51	.276	.141	8,150	57,800	
136	... do	¼	1.00	.276	.276	14,980	54,300	
137	.. do	¼	1.02	.273	.278	16,040	57,700	
138	....do	¼	1.00	.276	.276	14,840	53,800	Seam developed half way across fracture.
139	....do	¼	1.00	.280	.280	14,680	52,430	
140	....do	¼	1.00	.252	.252	12,450	49,400	
141	....do	¼	1.02	.275	.281	15,190	54,060	
142	.. do	1	1.01	.247	.249	13,140	52,770	
143	.. do	1	1.00	.278	.278	15,189	54,600	
144	....do	¼	1.50	.276	.414	20,340	49,130	
145	....do	¼	1.52	.273	.415	21,290	51,300	
146	.. do	¼	1.48	.251	.371	17,520	47,220	
147	....do	¼	1.51	.273	.412	22,000	53,400	
148	.. do	¼	1.52	.275	.418	22,650	54,180	
149	... do	¼	1.50	.276	.414	22,600	54,600	
150	... do	1	1.48	.274	.406	22,840	56,250	
151	.. do	1	1.50	.249	.374	17,300	46,260	
152	.. do	¼	2.01	.275	.553	25,380	45,900	
153	... do	¼	2.05	.279	.572	26,780	46,820	
154	... do	¼	2.00	.275	.550	26,370	47,950	
155	....do	¼	2.00	.278	.556	27,600	49,640	
156	.. do	¼	2.00	.286	.572	25,540	44,650	Open weld in rolling at fracture.
157	....do	¼	2.00	.275	.550	27,930	50,780	
158	....do	1	2.02	.279	.564	27,550	48,850	
159	....do	1	2.00	.277	.554	27,610	49,840	
160	....do	¼	2.51	.244	.612	27,530	44,980	
161	... do	¼	2.52	.280	.706	28,350	40,150	
162	.. do	¼	2.51	.282	.708	30,550	43,150	
163	... do ...	¼	2.50	.244	.610	27,760	45,500	
164	....do	¼	2.51	.285	.715	33,240	46,500	Small open weld in rolling at fracture.
165	....do	¼	2.49	.242	.603	29,860	49,520	
166	....do	1	2.49	.242	.603	.....	.....	
167	... do	1	2.50	.280	.700	31,350	44,780	
168	....do	¼	3.02	.250	.755	34,500	45,700	
169	....do	¼	3.02	.249	.752	33,740	44,870	
170	....do	¼	3.00	.240	.720	33,670	46,760	
171	....do	¼	3.00	.250	.750	34,280	45,700	
172	....do	¼	2.93	.242	.709	34,000	47,950	
173	....do	¼	2.99	.250	.748	36,460	48,740	
174	....do	1	2.98	.279	.831	38,140	45,900	
175	....do	1	3.01	.281	.846	37,570	44,410	

Tensile tests of ¼″ grooved specimens steel plate.

Number.	Plate.	Diameter of groove.	Width at bottom of groove.	Thickness of plate.	Sectional area.	Ultimate strength. Actual pounds.	Ultimate strength. Pounds per sq. inch.	Remarks.
		Inch	*Inch.*	*Inch.*	*Sq. in.*			
176	Punched..	5/16	.49	.250	.123	8,010	65,120	
177	... do	5/16	.47	.249	.117	7,840	67,010	
178	....do	¼	.48	.249	.120	7,610	63,420	
179	....do	¼	.48	.248	.119	7,920	66,550	
180	....do	1	.48	.247	.119	7,980	67,060	
181	....do	1	.47	.248	.117	7,640	65,300	
182	....do	5/16	.99	.249	.246	14,720	59,840	
183	....do	5/16	1.00	.250	.250	15,540	62,160	
184	....do	¼	1.01	.249	.251	17,130	68,246	
185	....do	¼	.96	.250	.240	16,160	67,330	
186	....do	1	.96	.248	.238	15,700	65,966	
187	....do	1	.95	.245	.233	14,610	62,700	
188	....do	5/16	1.45	.248	.360	23,070	64,080	
189	....do	¼	1.45	.252	.365	23,360	64,000	

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Tensile tests of ¼″ grooved specimens steel plate—Continued.

Number.	Plate.	Diameter of groove.	Width at bottom of groove.	Thickness of plate.	Sectional area.	Ultimate strength. Actual pounds.	Ultimate strength. Pounds per sq. inch.	Remarks.
		Inch.	*Inch.*	*Inch.*	*Sq. in.*			
190	....do	1	1.45	.249	.361	22,030	61,025	
191	....do	1	1.51	.251	.379	22,520	59,420	
192	....do	1	1.96	.250	.490	29,350	59,900	
193	... do	1	1.93	.252	.486	30,860	63,500	
194	....do	1	1.98	.250	.495	29,380	59,350	
195	... do	1	1.96	.251	.492	29,060	59,060	
196	....do	1	2.49	.249	.620	36,020	58,100	
197	... do	1	2.47	.249	.615	39,300	63,900	
198	... do	1	2.43	.250	.608	37,460	61,640	
199	... do	1	2.95	.251	.740	41,830	56,539	Specimen tore apart from one edge.
200	....do	1	3.01	.249	.749	44,030	58,780	
201	....do	1	3.04	.253	.769	42,680	55,500	
202	....do	1	2.97	.252	.748	44,920	60,060	
203	....do	1	2.98	.251	.748	40,430	54,050	
204	....do	1	2.97	.249	.740	41,470	56,040	

Above fractures, silky appearance. Specimens 1″ wide fracture at the sides of the groove before breaking at the center. The same remarks apply to all specimens above 1″ in width.

Specimens ½″ wide at bottom of groove break square across, leaving the fractured ends straight.

Tensile tests of ¼″ grooved specimens steel plate.

Number.	Plate.	Diameter of groove.	Width at bottom of groove.	Thickness of plate.	Sectional area.	Ultimate strength. Actual pounds.	Ultimate strength. Pounds per sq. inch.	Area at fracture.	Contraction of area.
		Inch.	*Inch.*	*Inch.*	*Sq. in.*				*Pr. ct.*
205	Drilled....	¼	.52	.246	.128	8,690	67,890		
206	....do	¼	.54	.248	.134	9,000	67,160	″.47×″.12=.056 square inch....	58.2
207	....do	¼	.53	.247	.131	8,760	66,870		
208	....do	¼	.50	.247	.123	8,070	65,610		
209	....do	¼	.51	.249	.127	8,430	66,370		
210	....do	¼	.51	.250	.128	8,630	67,420		
211	...s do	1	.52	.248	.129	8,740	67,750		
212	....do	1	.52	.252	.131	8,110	61,910	″.41×″.12=.049 square inch....	62.6
213	....do	1	1.03	.247	.254	17,040	67,090		
214	....do	1	1.02	.250	.255	16,930	66,390	″.95×″.13=.124 square inch....	51.4
215	....do	1	1.02	.246	.251	16,760	66,770		
216	...do	1	1.02	.250	.255	17,270	67,730	″.92×″.13=.120 square inch....	53.0
217	....do	1	1.01	.247	.249	16,440	66,020		
218	...do	1	1.00	.251	.251	16,820	67,010	″.90×″.13=.117 square inch....	53.4
219	....do	1	1.00	.247	.247	15,920	64,450		
220	....do	1	1.01	.250	.253	16,720	66,090	″.89×″.13=.116 square inch....	54.1
221	....do	1	1.54	.250	.385	24,790	64,390		
222	....do	1	1.52	.251	.382	24,200	63,350		
223	....do	1	1.50	.253	.380	24,460	64,370		
224	....do	1	1.54	.248	.382	24,790	64,895		
225	....do	1	2.02	.252	.509	32,740	64,320		
226	....do	1	2.00	.251	.502	31,610	62,970		
227	....do	1	2.02	.251	.507	30,880	60,910		
228	....do	1	2.50	.248	.620	36,740	59,260		
229	....do	1	2.50	.252	.630	39,850	63,250		
230	....do	1	2.53	.248	.627	37,240	59,390		
231	....do	1	3.03	.251	.761	46,860	61,577		
232	....do	1	3.00	.249	.747	44,130	59,080		
233	....do	1	3.02	.251	.758	45,140	59,550		
234	....do	1	3.02	.250	.755	45,070	59,700		
235	....do	1	3.00	.250	.750	47,530	63,370		
236	....do	1	3.00	.251	.753	44,150	58,630		
237	....do	1	3.03	.252	.764	48,850	63,940		

Above fractures silky in appearance.

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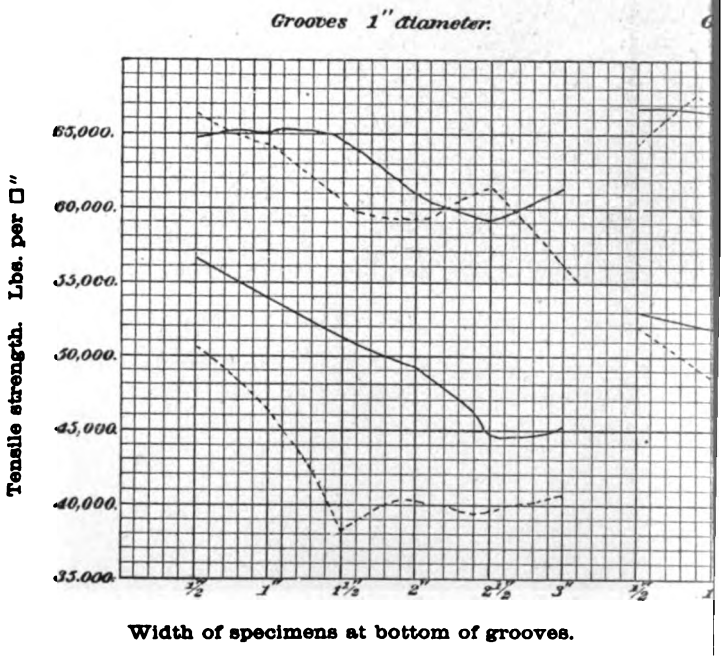

S. Ex. 1——face p. 145——2

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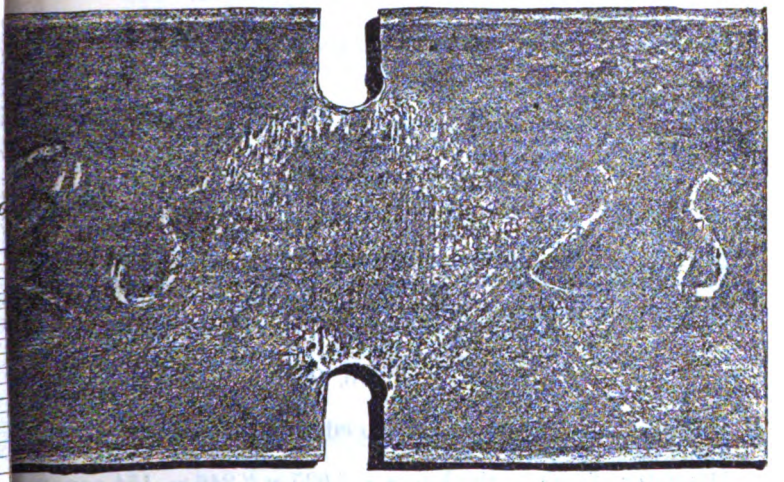
ARKS.—Specimens with $\frac{1}{4}''$ groove $1''$ wide fracture first at sides, tearing to the center of the part tested.
imens with $\frac{1}{2}''$ groove $1''$ wide break square across, the fracture place at the same time over the full width.
imens with $\frac{3}{4}''$ groove fractured in the same manner as the $\frac{1}{2}''$ d ones.
imens with $1''$ groove $1''$ wide separate first at the middle.
imens $3''$ wide all fractured irregular across plate, those with grooves showing the greatest convexity of fractured ends.



ograph of grooved specimen, No. 229, showing the developement of "Cooper lines."

est of this specimen was discontinued after the ultimate strength n determined and before fracture took place.

. Ex. 1——10

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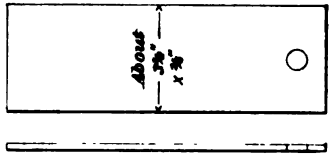
Tests to determine the ultimate resistance of plate steel to tearing out at rivet holes.

¼″ STEEL PLATE.

Quality of metal from tensile test:
Elastic limit, 40,860 pounds per square inch.
Ultimate strength, 55,760 pounds per square inch.
Uniform elongation after fracture, 20 per cent.
Contraction of area at fracture, 56.5 per cent.
Appearance of fracture, silky.
Steel plate of ¼″ nominal thickness of the form shown by sketch.



⅝″ drilled hole spaced at distance *A* from the end of plate. Value of *A* running from 1″ to 2″, advancing by ¼″. 2 specimens of a kind.
⅝″ steel pin used in ⅝″ holes.

No. 469.

Distance from center of hole to edge of plate, 1″.
Thickness of plate, ″.246.
Diameter of hole × thickness = ″.625 × ″.246 = .154 square inch.

Loads applied.	Elongation of hole.	Permanent elongation of hole.	Remarks.
Pounds.	*Inch.*	*Inch.*	
3,500	.01	0.	Loads released to measure permanent elongation of hole.
5,000	No further change.		
7,000	.01+	About .00½	Color changes front of hole.
8,000	.02	.....	Color changes front of hole; wider strip covers.
9,000	.02½	.01	Scale starts front of hole.
10,000	.04	.02½	
12,000	.06	.05	
13,000	.08	.....	
14,000	.11	.10	Hole widens transversely about ″.00½.
15,000	.15	.....	
16,000	.27	.....	
16,150	.....	.34	Depth front of hole, ″.57, showing a reduction of ″.11.
16,200	.....	.....	Ultimate strength = 105,190 pounds per square inch on the compression area of hole.

Test discontinued before the metal separated front of hole, the permanent elongation of the hole having reached ″.48.

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No. 470.

Duplicate of No. 469.
Thickness of plate, ″.250.
Diameter of hole × thickness (″.625 × .250) = .156 square inch.

Loads applied.	Elongation of hole.	Remarks.
Pounds.	*Inch.*	
3,300	.00½	
4,200	.01	
8,800	.02	
10,500	.03	
12,000	.05	
13,000	.07	
14,000	.11	
15,000	.16	
16,380	.38	Ultimate strength = 105,000 pounds per square inch compression.

No. 471.

Thickness of plate, ———.
Distance from center of ⅝″ hole to end of plate, 1″.23.
Compression area, ″.250 × ″.625 = .156 square inch.
Micrometer dial applied for getting measurements.

Loads applied.	Elongation of hole.	Permanent elongation of hole.	Remarks.
Pounds.	*Inch.*	*Inch.*	
1,000	0.	.....	
1,500	.0006	.....	
1,000	.....	.0001	
2,000	.0011	.....	
2,500	.0016	.....	
3,000	.0022	.....	
3,500	.0029	.....	
1,000	.....	.0010	
4,000	.0034	.....	
4,500	.0041	.....	
5,000	.0046	.....	
1,000	.....	.0011	
5,500	.0052	.....	
6,000	.0061	.....	
6,500	.0071	.....	
7,000	.0077	.....	
7,500	.0086	.....	
8,000	.0093	.....	
8,500	.0101	.....	
9,000	.0113	.....	
9,500	.0129	.....	
10,000	.0142	.....	
1,000	.....	.0082	
10,500	.0171	.....	
11,000	.0199	.....	
12,000	.0300	.....	
13,000	.043	.....	
14,000	.061	.....	
15,000	.083	.....	
16,000	.114	.....	
20,400	.....	.....	Ultimate strength = 130,770 pounds per square inch compression.

Fracture began at sides of hole.
Total elongation when maximum strain was reached, about ″.62

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No. 472.

Duplicate of No. 471.
Thickness of plate, ″.249.
Distance from center of $\frac{5}{8}$″ hole to end of plate, 1″.29.
Compression area, .156 square inch.

Loads applied.	Elongation of hole.	Permanent elongation of hole.	Remarks.
Pounds.	*Inch.*	*Inch.*	
1,000	0.	.....	
5,000	.0080	.....	
7,000	.0120	.....	
8,000	.0150	.....	
1,000	.....	.0100	
9,000	.0175	.....	
9,500	.019	.....	
10,000	.021	.....	
10,500	.023	.....	
11,000	.026	.....	
11,500	.030	.....	
12,000	.037	.....	
12,500	.044	.....	
13,000	.052	.....	
13,500	.060	.....	
14,000	.071	.....	
15,000	.096	.....	
20,180	.....	.....	Ultimate strength=129,360 pounds per square inch compression.

Fracture began at end of plate, front of hole, when elongation of hole had reached ″.57.

No. 473.

Thickness of plate, ″.250.
Distance from center of $\frac{5}{8}$″ hole to end of plate, 1″.51.
Compression area, .156 square inch.

Loads applied.	Elongation of hole.	Permanent elongation of hole.	Remarks.
Pounds.	*Inch.*	*Inch.*	
1,000	0.	.....	
5,000	.0075	.....	
10,000	.0181	.....	
1,000	.....	.0125	
11,000	.0220	.....	
11,500	.0240	.....	
12,000	.0268	.....	
12,500	.0308	.....	
13,000	.034	.....	
13,500	.040	.....	
14,000	.047	.....	
14,500	.055	.....	
15,000	.064	.....	
15,500	.074	.....	
23,900	.....	.....	Ultimate strength=153,200 pounds per square inch compression.

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No. 474.

Duplicate of No. 473.
Thickness of plate, ".253.
Distance from center of hole to end of plate, 1".51.
Compression area, .160 square inch.

Loads applied.	Elongation of hole.	Permanent elongation of hole.	Remarks.
Pounds.	*Inch.*	*Inch.*	
1,000	0.	.....	NOTE.—The shape of the specimen after fracture appears to indicate that the ultimate strength is somewhat lower than would be attained if the specimen was wider, so as to prevent the metal from widening the test piece at the end.
5,000	.0050	.....	
10,000	.0156	.....	
1,000	.....	.0096	
11,000	.0195	.....	
12,000	.0250	.....	
12,500	.0285	.....	
13,000	.0325	.....	
13,500	.0385	.....	
14,000	.0447	.....	
14,500	.0523	.....	
15,000	.0610	.....	
15,500	.0703	.....	
16,000	.0805	.....	
17,000	.1030	.....	
18,000	.131	.....	
19,000	.165	.....	
20,000	.208	.....	
21,000	.264	.....	
22,000	.346	.....	
24,700	.....	.....	Ultimate strength=154,370 pounds per square inch compression.

Failed the same as No. 473, by the metal front of the hole tearing apart.

No. 475.

Thickness of plate, ".246.
Distance from center of hole to end of plate, 1".75.
Compression area, .154 square inch.

Loads applied.	Elongation of hole.	Permanent elongation of hole.	Remarks.
Pounds.	*Inch.*	*Inch.*	
1,000	0.	.....	
10,000	.0172	.....	
1,000	.....	.0118	
10,500	.0190	.....	
11,000	.0208	.....	
11,500	.0220	.....	
12,000	.0258	.....	
12,500	.0282	.....	
13,000	.0315	.....	
13,500	.0350	.....	
14,000	.0390	.....	
14,500	.0435	.....	
15,000	.0490	.....	
15,500	.0545	.....	
16,000	.0620	.....	
16,500	.0700	.....	
17,000	.0785	.....	
28,700	.....	.....	Ultimate strength=186,360 pounds per square inch compression.

Failed by tension at end of plate, front of hole, and also shearing at sides of hole.

Scale disturbed the full width ($3\frac{1}{2}$") of the plate on either side of the hole.

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No. 476.

Duplicate of No. 475.
Thickness of plate, ".249.
Distance from center of hole to end of plate, 1".73.
Compression area, 1.56 square inches.

Loads applied.	Elongation of hole.	Permanent elongation of hole.	Remarks.
Pounds.	*Inch.*	*Inch.*	
1,000	0.	.....	
10,000	.0216	.....	
1,000	.....	.0158	
12,000	.0330	.....	
12,500	.0360	.....	
13,000	.0410	.....	
13,500	.0455	.....	
14,000	.0515	.....	
14,500	.0580	.....	
15,000	.0660	.....	
15,500	.0740	.....	
16,000	.0845	.....	
16,500	.0950	.....	
17,000	.1060	.....	
17,500	.1182	.....	
18,000	.1320	.....	
27,500	.....	.....	Ultimate strength = 176,280 pounds per square inch compression.

Tore apart front of hole, fracture beginning at the end of the plate; sheared out piece, width about $\frac{5}{8}$".

The manner of failure probably would have been different with a wider specimen, as this specimen widened at the end in a marked manner.

No. 477.

Thickness of plate, ".248.
Distance from center of hole to end of plate, 1".98.
Compression area, .155 square inch.

Loads applied.	Elongation of hole.	Permanent elongation of hole.	Remarks.
Pounds.	*Inch.*	*Inch.*	
1,000	0.	.....	
10,000	.0162	.....	
1,000	.....	.0110	
12,000	.0252	.....	
12,500	.0282	.....	
13,000	.0315	.....	
13,500	.0350	.....	
14,000	.0390	.....	
14,500	.0435	.....	
15,000	.0480	.....	
15,500	.0530	.....	
16,000	.0590	.....	
16,500	.0650	.....	
17,000	.0712	.....	
17,500	.0788	.....	
18,000	.0870	.....	
18,500	.0968	.....	
19,000	.1080	.....	
31,800	.....	.....	Ultimate strength = 205,160 pounds per square inch compression.

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No. 478.

Duplicate of No. 477.
Thickness of plate, ".248.
Distance from center of §" hole to end of plate, 1".99.
Compression area, 1.55 square inches.

Loads applied.	Elongation of hole.	Permanent elongation of hole.	Remarks.
Pounds.	*Inch.*	*Inch.*	
1,000	0.		
10,000	.0222		
1,000		.0165	
12,000	.0330		
13,000	.0460		
13,500	.0445		
14,000	.0490		
14,500	.0550		
15,000	.0600		
15,500	.0662		
16,000	.0738		
16,500	.0820		
17,000	.0915		
17,500	.1015		
18,000	.1120		
31,050			Ultimate strength = 200,320 pounds per square inch compression.

Details of riveted joints.

STEEL PLATES—PUNCHED HOLES.

Steel plates, from No. 469 to No. 478, inclusive, punched 11".16 holes for §" rivets through opposite end to that drilled.

The specimens were riveted together in pairs, and afterwards the rivet heads were planed off and the rivets driven out.

This leaves the punched holes in substantially the condition they are used in practice.

A steel pin, ".70 diameter, is used through the holes.

Punched holes in specimens Nos. 479 to 483, inclusive, and Nos. 401 to 405, inclusive.

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No. 479.

Distance from center of hole to end of plate, 1″.05.
Diameter of hole, ″.71.
Thickness of plate, 2″.46.
Compression area, ″.246 × ″.70 = .172 square inch.
End of plate was sheared.

Loads applied.	Elongation of hole.	Permanent elongation of hole.	Remarks.
Pounds.	*Inch.*	*Inch.*	
1,000	.....	.....	
2,000	.0022	.....	
3,000	.0040	.....	
4,000	.0060	.....	
5,000	.0077	.....	
1,000	.....	.0042	
6,000	.0097	.....	
6,500	.0104	.....	
7,000	.0114	.....	
7,500	.0123	.....	
8,000	.0132	.....	
8,500	.0142	.....	
9,000	.0151	.....	
9,500	.0160	.....	
10,000	.0170	.....	
10,500	.0180	.....	
11,000	.0190	.....	
11,500	.0201	.....	
12,000	.0213	.....	
12,500	.0232	.....	
13,000	.0262	.....	
13,500	.0280	.....	
14,000	.0323	.....	
14,500	.0392	.....	
15,000	.0502	.....	
15,500	.0692	.....	
16,000	.1024	.....	
16,500	.1502	.....	
17,000	.2802	.....	
17,150	.3050	.....	Ultimate strength = 99,710 pounds per square inch compression.

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No. 480.

Distance from center of hole to end of plate, 1″.02.
End of plate planed.
Thickness of plate, ″.250.
Compression of area, .175 square inch.

Loads applied.	Elongation of hole.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
5,000	.0064	
8,000	.0100	
8,500	.0104	
9,000	.0112	
9,500	.0118	
10,000	.0124	
10,500	.0132	
11,000	.0139	
11,500	.0147	
12,000	.0155	
12,500	.0166	
13,000	.0180	
13,500	.0194	
14,000	.0214	
14,500	.0249	
15,000	.0322	
15,500	.0434	
16,000	.0594	
16,500	.0874	
17,000	.1374	
17,310	.2104	Ultimate strength = 98,910 pounds per square inch compression.

Sheared out plate in front of hole.

No. 481.

Distance from center of hole to end of plate, 1″.28.
End planed.
Thickness of plate, ″.250.
Compression area, .175 square inch.

Loads applied.	Elongation of hole.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
5,000	.0048	
8,000	.0070	
10,000	.0090	
11,000	.0101	
11,500	.0110	
12,000	.0119	
12,500	.0128	
13,000	.0138	
13,500	.0148	
14,000	.0162	
14,500	.0180	
15,000	.0205	
15,500	.0241	
16,000	.0298	
16,500	.0380	
17,000	.0482	
17,500	.0600	
18,000	.0755	
18,500	.0980	
19,000	.1158	
19,500	.1440	
20,000	.1790	
20,500	.1990	
20,880	.2070	
21,400	.....	Ultimate strength = 122,280 pounds per square inch.

Failed by shearing out front of hole.

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No. 482.

Distance from center of hole to end of plate, 1″.26.
Sheared end to plate.
Skin planed off one side of plate at the hole about ″.003 deep.
Thickness of plate, ″.249.
Compression area, ″.246 × ″.70=.172 square inch.

Loads applied.	Elongation of hole.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
5,000	.0078	
8,000	.0120	
10,000	.0148	
11,000	.0161	
11,500	.0171	
12,000	.0181	
12,500	.0195	
13,000	.0210	
13,500	.0228	
14,000	.0250	
14,500	.0290	
15,000	.0348	
15,500	.0430	
16,000	.0540	
16,500	.0670	
17,000	.0850	
17,500	.1060	
18,000	.1330	
19,000	.2050	
19,780	.....	Ultimate strength = 115,000 pounds per square inch compression.

Failed in the same manner as No. 480. Its strength probably impaired by the slight strip planed off at side of hole.

No. 483.

Distance from center of hole to end of plate.
Planed end of specimen.
Thickness of plate, ″.250.
Compression area, .175 square inch.

Loads applied.	Elongation of hole.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
5,000	.0035	
10,000	.0085	
11,000	.0098	
11,500	.0105	
12,000	.0115	
12,500	.0123	
13,000	.0135	
13,500	.0146	
14,000	.0157	
14,500	.0172	
15,000	.0187	
15,500	.0209	
16,000	.0237	
16,500	.0277	
17,000	.0322	
17,500	.0387	
18,000	.0465	
19,000	.0637	
20,000	.0857	
21,000	.1127	
22,000	.1487	
23,000	.1917	
24,000	.2577	
24,820	.3790	Ultimate strength = 141,830 pounds per square inch compression.

Failed in the same manner as No. 480.

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No. 401.

Distance from center of hole to end of plate, 1″.49.
Planed end of specimen.
Thickness of plate, 2″.53.
Compression area, .177 square inch.

Loads applied.	Elongation of hole.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
5,000	.0038	
10,000	.0090	
11,000	.0101	
12,000	.0115	
12,500	.0121	
13,000	.0130	
13,500	.0140	
14,000	.0150	
14,500	.0160	
15,000	.0178	
15,500	.0192	
16,000	.0212	
16,500	.0240	
17,000	.0272	
17,500	.0315	
18,000	.0378	
19,000	.0540	
20,000	.0780	
21,000	.0980	
22,000	.1230	
23,000	.1730	
24,000	.2460	
24,350	.3110	Ultimate strength = 137,570 pounds per square inch compression.

Failed same as No. 480.

No. 402.

Distance from center of hole to end of plate, 1″.75.
Planed end of plate.
Thickness of plate, ″.246.
Compression area, ″.172 square inch.

Loads applied.	Elongation of hole.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
5,000	.0064	
10,000	.0160	
12,000	.0196	
12,500	.0206	
13,000	.0216	
13,500	.0227	
14,000	.0240	
14,500	.0254	
15,000	.0270	
15,500	.0287	
16,000	.0306	
16,500	.0334	
17,000	.0363	
17,500	.0393	
18,000	.0445	
18,500	.0506	
19,000	.0575	
19,500	.0665	
20,000	.0755	
21,000	.0965	
22,000	.1205	
23,000	.1490	
24,000	.1810	
25,000	.2130	
26,000	.2830	
26,500	.3190	Ultimate strength = 154,070 pounds per square inch compression.

Failed the same as No. 480.

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No. 403.

Distance from center of hole to end of plate, 1″.76.
Plate sheared across end.
Thickness of plate, ″.249.
Compression area, ″.174 square inch.

Loads applied.	Elongation of hole.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
5,000	.0158	
10,000	.0195	
12,000	.0220	
12,500	.0228	
13,000	.0238	
13,500	.0249	
14,000	.0261	
14,500	.0280	
15,000	.0300	
15,500	.0325	
16,000	.0355	
16,500	.0410	
17,000	.0470	
17,500	.0532	
18,000	.0605	
18,500	.0690	
19,000	.0788	
19,500	.0900	
20,000	.1025	
21,000	.1295	
22,000	.1600	
23,000	.1930	
24,000	.2360	
25,000	.2820	
25,900	.3820	Ultimate strength = 148,850 pounds per square inch compression.

Failed in the same manner as No. 480.

No. 404.

Thickness of plate, ″.248.
Average diameter of punched hole (″.70+″.78)=″.74.
Distance from center of hole to end of plate, 2″.
The end of the specimen is planed.
Compression area, ″.174 square inch.

Loads applied.	Elongation of hole.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
5,000	.0081	
10,000	.0192	
12,000	.0236	
13,000	.0261	
13,500	.0279	
14,000	.0296	
14,500	.0310	
15,000	.0331	
15,500	.0352	
16,000	.0380	
16,500	.0409	
17,000	.0436	
17,500	.0470	
18,000	.0515	
18,500	.0550	
19,000	.0625	
19,500	.0698	
20,000	.0778	
20,500	.0872	
21,000	.0961	
22,000	.1208	
23,000	.1455	
24,000	.1700	
25,000	.2060	
28,900	.3770	
29,200	.....	Ultimate strength = 167,820 pounds per square inch compression.

Failed same as No. 480. Appearance of fracture silky.

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No. 405.

Thickness of plate, ".248.
Diameter of punched holes: Punch side, ".77; die side, ".81; average diameter, ".79.
Same pin used as before, ".70 diameter.
Distance from center of hole to end of plate, 2".05.
Plate planed across end.
Compression area, .174 square inch.

Loads applied.	Elongation of hole.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
5,000	.0095	
10,000	.0240	
12,000	.0320	
14,000	.0420	
15,000	.0480	
15,500	.0515	
16,000	.0549	
16,500	.0590	
17,000	.0620	
17,500	.0662	
18,000	.0710	
18,500	.0756	
19,000	.0812	
19,500	.0889	
20,000	.0962	
21,000	.1140	
22,000	.1340	
23,000	.1618	
24,000	.1895	
25,000	.2228	
30,980	.....	Ultimate strength=178,050 pounds per square inch compression.

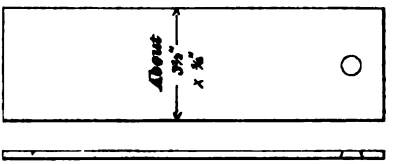
Failed the same as No. 480.

Details of riveted joints.

¼" Steel Plate—Punched Holes.

Resistance of plates to tearing out punched holes; ⅝" punched holes plates not riveted.
Holes varying from 1" to 2" from end of plates.

FORM OF SPECIMENS.



Holes punched: Punch side, ".64 diameter; die side, ".70 diameter.
Pin used in punched holes, ⅝" diameter.
Sheared ends.

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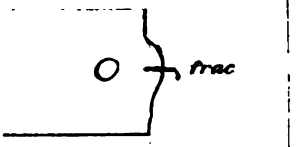
Number of test.	Distance from center of hole to end of plate.	Thickness of plate.	Compression area. Diameter of pin × thickness of plate.	Ultimate resistance. Actual pounds.	Ultimate resistance. Pounds per square inch on compression area.	Remarks.
	Inches.	*Inch.*	*Sq. in.*			
406	1.00	.246	.154	15,770	102,400	
407	1.04	.248	.155	16,990	109,600	
408	1.27	.245	.153	19,780	129,300	
409	1.27	.245	.153	20,270	132,500	Fractures all began at sheared ends, as shown above.
410	1.50	.246	.154	21,900	142,200	
411	1.50	.247	.154	23,210	150,700	
412	1.74	.246	.154	25,390	164,900	
413	1.72	.247	.154	25,490	165,500	
414	2.00	.243	.152	27,830	183,100	
415	1.99	.245	.153	29,300	191,500	

Above specimens, Nos. 406 to 415, inclusive, prepared with $\frac{11}{16}$″ drilled holes through opposite ends.

Same $\frac{5}{8}$″ pin used as before.

¼″ Steel Plate, $\frac{11}{16}$″ Drilled Holes.

SHEARED ENDS.

Number of test.	Distance from center of hole to end of plate.	Thickness of plate.	Compression area. Diameter of pin × thickness of plate.	Ultimate resistance. Actual pounds.	Ultimate resistance. Pounds per square inch on compression area.	Remarks.
	Inches.	*Inch.*	*Sq. in.*			
416	1.00	.252	.158	15,800	100,000	Fractures all began at sheared end, except No. 424, which began at the holes.
417	1.00	.246	.154	16,100	104,500	
418	1.25	.247	.154	19,430	126,200	
419	1.25	.244	.153	18,970	124,000	
420	1.50	.246	.154	21,850	141,900	
421	1.50	.244	.153	21,550	140,850	
422	1.77	.245	.153	23,900	156,200	
423	1.78	.250	.156	27,890	178,800	
424	2.02	.246	.154	28,470	184,900	
425	2.03	.245	.153	28,800	188,200	

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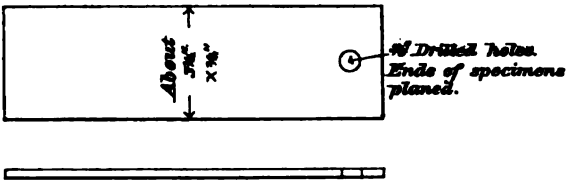
WROUGHT-IRON PLATE.

(Tests to determine the ultimate resistance of iron plate to tearing out at the rivet holes.)

$\frac{5}{8}$" DRILLED HOLES.

SHAPE OF SPECIMENS.



No. 445.

Thickness of plate, ".241.
From center of hole to end of plate, ".99.
Compression area of hole ".625 × ".241 = .151 square inch.

Loads applied.	Elongation of hole.	Permanent elongation of hole.	Remarks.
Pounds.	*Inch.*	*Inch.*	
1,000	.....	.....	
5,000	.0065	.....	
1,000	.....	.0035	
6,000	.0088	.....	
7,000	.0115	.....	
8,000	.0165	.....	
9,000	.0248	.....	
9,500	.0308	.....	
10,000	.0398	.....	
10,250	About .09	.....	Ultimate strength = 67,880 pounds per square inch on compression area of holes.

Failed by developing a fracture at end of plate, where metal was under tensile strain. Fracture then extended towards drilled hole.

No. 446.

Duplicate of No. 445.
Thickness of plate, ".244.
Distance from center of hole to end of plate, 1".
Compression area of hole, ".625 × ".244 = .153 square inch.

Loads applied.	Elongation of hole.	Permanent elongation of holes.	Remarks.
Pounds.	*Inch.*	*Inch.*	
1,000	0.	.....	
5,000	.0060	.....	
1,000	.....	.0028	
6,000	.0071	.....	
6,500	.0080	.....	
7,000	.0090	.....	
7,500	.0100	.....	
8,000	.0118	.....	
8,500	.0140	.....	
9,000	.0176	.....	
9,500	.0220	.....	
10,000	.0285	.....	
10,500	.0345	.....	
11,000	.0480	.....	
11,280	.0630	.....	Ultimate strength = 73,720 pounds per square inch on compression area.

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Test continued after passing the ultimate resistance, developing fractures on either side of the hole.

The initial fracture began at the end of the plate, reaching back to the hole.

No. 447.

Compression area, ″.625 × ″.245 = .153 square inch.
Thickness of plate, ″.245.
Distance from center of $\frac{5}{8}$″ hole to end of plate, 1″.25.

Loads applied.	Elongation of hole.	Remarks.
Pounds.	*Inch.*	
1,000	.....	
2,000	.0020	
3,000	.0036	
4,000	.0055	
5,000	.0071	
6,000	.0086	
6,500	.0096	
7,000	.0106	
7,500	.0118	
8,000	.0135	
8,500	.0150	
9,000	.0168	
9,500	.0189	
10,000	.0215	
10,500	.0244	
11,000	.0296	
11,500	.0355	
12,000	.0430	
12,500	.0535	
12,720	.0705	Ultimate strength = 83,140 pounds per square inch on compression area.

Failed same as specimen No. 445..

No. 448.

Duplicate of No. 447.
Thickness of plate, ″.243.
Distance from center of hole to end of plate, 1″.22.
Compression area, ″.625 × ″.243 = .152 square inch.

Loads applied.	Elongation of hole.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
5,000	.0070	
6,000	.0090	
6,500	.0100	
7,000	.0169	
7,500	.0118	
8,000	.0128	
8,500	.0142	
9,000	.0161	
9,500	.0182	
10,000	.0210	
10,500	.0245	
11,000	.0290	
11,500	.0342	
12,000	.0410	
12,500	.0500	
13,000	.0810 .0880	Ultimate strength = 85,530 pounds per square inch on compression area.

Failed same as No. 445.

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No. 449.

Thickness of plate, ″.243.
Distance from center of hole to end of plate, 1″.50.
Compression area, ″.625 × ″.243 = .152 square inch.

Loads applied.	Elongation of hole.	Remarks.
Pounds.	*Inch.*	
1,000	.....	
5,000	.0042	
6,000	.0053	
6,500	.0063	
7,000	.0073	
7,500	.0083	
8,000	.0093	
8,500	.0107	
9,000	.0122	
9,500	.0142	
10,000	.0162	
10,500	.0187	
11,000	.0217	
11,500	.0247	
12,000	.0287	
12,500	.0332	
13,000	.0392	
13,500	.0460	
14,000	.0537	
15,510	.0992	Ultimate strength = 102,040 pounds per square inch on compression.

Failed same as No. 445.

No. 450.

Duplicate of No. 449.
Thickness of plate, ″.243.
Distance from center of hole to end of plate, 1″.50.
Compression area, .152 square inch.

Loads applied.	Elongation of hole.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
5,000	.0049	
6,000	.0060	
7,000	.0078	
7,500	.0089	
8,000	.0100	
8,500	.0112	
9,000	.0130	
9,500	.0151	
10,000	.0175	
10,500	.0208	
11,000	.0239	
11,500	.0275	
12,000	.0321	
12,500	.0380	
13,000	.0450	
13,500	.0520	
14,000	.0610	
15,000	.0810	
15,780	.1180	Ultimate strength = 103,820 pounds per square inch compression.

Fractured same as No. 445.

$\frac{1}{4}$″ plates Nos. 445 to 450, inclusive, that have been tested with drilled holes, now prepared with punched holes through opposite ends, punched and riveted together in pairs with $\frac{5}{8}$″ iron rivets. The rivet heads were planed off and the rivets driven out.

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It is found that these machine-driven rivets produce serious injury to the plates. When the hole was within $1\frac{1}{4}''$ of the edge the plates were burst by the rivets, starting fractures at the edge of the plate.

While the plates in this condition, with fracture already developed, will fail to give the comparative strength of drilled and punched holes, the results will probably give an indication of the strength of riveted joints in iron plates that have been weakened in this same manner.

Specimens Nos. 451 to 456, inclusive, have punched holes. Size of punch, $\frac{11}{16}''$ diameter; die, $\frac{3}{4}''$ diameter.

Diameter of pin used in punched holes, ".70.

No. 451.

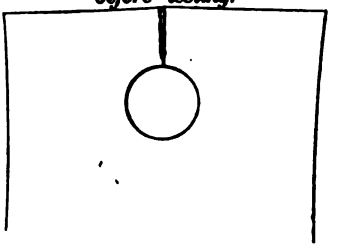
Thickness of plate, ".241.

Distance from center of hole to end of plate, 1".

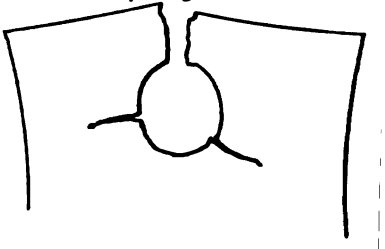
Compression area ".241 × ".70 = .1687 square inch.

Loads applied.	Elongation of hole.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
5,000	.0215	
6,000	.0275	
7,000	.0338	
8,000	.0410	
8,250	.....	Ultimate strength = 48,900 pounds per square inch compression.

Sketch of specimen before testing.



Showing fractures developed by test.



No. 452.

Thickness of plate, ".244.

Distance from center of whole to end of plate, 1".

Compression area ".244 × ".70 = .171 square inch.

8,100 pounds ultimate strength = 47,370 pounds per square inch compression.

Fracture started same as in No. 451.

Afterwards developed fractures at sides of hole.

No. 453.

Thickness of plate, ".245.

Distance from center of hole to end of plate, 1".25.

Compression area, ".245 × ".70 = .172 square inch.

11,200 pounds ultimate strength = 65,120 pounds per square inch compression.

Fracture at end of plate about 4" long, reaching back towards hole.

End of specimen sheared.

Failed by opening initial fracture and a fracture at side of hole.

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No. 454.

Thickness of plate, ″.243.
Distance from center of hole to end of plate, 1″.20.
Compression area, ″.243 × ″.70 = .17 square inch.
Fracture in end of plate caused by riveting similar to No. 453.
12,500 pounds ultimate strength = 73,530 pounds per square inch compression.

No. 455.

Thickness of plate, ″.243.
Distance from center of hole to end of plate, 1″.47.
Compression area, ″.243 × ″.70 = .170 square inch.
Punched hole about ″.02 larger in diameter than the punch and die used.
No fracture in sight caused by riveting.
End of plate sheared.

Loads applied.	Elongation of hole.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
5,000	.0062	
10,000	.0206	
10,500	.0215	
11,000	.0230	
11,500	.0248	
12,000	.0268	
12,500	.0289	
13,000	.0310	
13,500	.0339	
14,000	.0380	
14,500	.0439	
15,000	.0530	
15,150	.0570	Ultimate strength = 89,120 pounds per square inch compression.

Fracture began at end of plate.

No. 456.

Thickness of plate, ″.243.
Distance from center of hole to end of plate, 1″.47.
End of plate planed.
Compression area, ″.243 × ″.70 = .170 square inch.

Loads applied.	Elongation of hole.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
5,000	.0070	
8,000	.0139	
10,000	.0188	
10,500	.0201	
11,000	.0218	
11,500	.0235	
12,000	.0255	
12,500	.0280	
13,000	.0305	
13,500	.0335	
14,000	.0372	
14,500	.0410	
15,000	.0460	
15,500	.0515	
16,000	.0605	
16,300	.0750	Ultimate strength = 95,900 pounds per square inch compression.

Failed by opening a fracture at the end of the plate.

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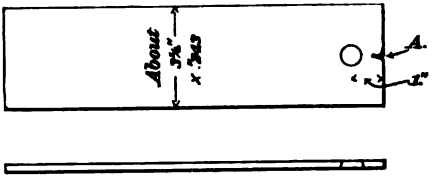
Nos. 457 to 462, inclusive.

$\frac{1}{4}$″ plates having $\frac{5}{8}$″ punched holes. Punch, ″.64 diameter; die, ″.71 diameter.

Plates did not have rivets driven. Ends planed.

Diameter of pin used in punched holes, $\frac{5}{8}$″.

No. 457.



Compression area, ″.243×″.625=.152 square inch.

Loads applied.	Elongation of hole.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
3,000	.0090	
5,000	.0182	
5,500	.0205	
6,000	.0230	
6,500	.0251	
7,000	.0285	
7,500	.0318	
8,000	.0358	
8,500	.0405	
9,000	.0450	
9,000	.0468	After twelve minutes rest.
9,500	.0528	
10,000	.0608	
10,500	.0718	
11,000	.1000	Ultimate strength=72,370 pounds per square inch compression.

Fracture began at end of plate at *A*.

No. 458.

Duplicate of No. 457.

Distance from center of hole to end of plate, 1″.

Compression area, ″.241×″.625=.151 square inch.

Loads applied.	Elongation of hole.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
5,000	.0211	
5,500	.0232	
6,000	.0260	
6,500	.0288	
7,000	.0310	
7,500	.0340	
8,000	.0370	
8,500	.0408	
9,000	.0440	
9,500	.0490	
10,000	.0558	
10,500	.0620	
11,000	.0720	
11,500	.0840	
11,860	.0990	Ultimate strength=78,540 pounds per square inch compression.

Fracture began at end of plate same as No. 457.

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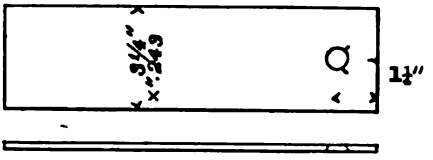
No. 459.



Compression area, ".243 × ".625 = .152 square inch.

Loads applied.	Elongation of hole.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
5,000	.0085	
5,500	.0102	
6,000	.0121	
6,500	.0140	
7,000	.0161	
7,500	.0185	
8,000	.0210	
8,500	.0235	
9,000	.0260	
9,500	.0300	
10,000	.0340	
10,500	.0395	
11,000	.0461	
11,500	.0530	
12,000	.0625	
12,500	.0728	
13,000	.0850	
13,440	.1040	Ultimate strength = 88,420 pounds per square inch compression.

Fracture began at end of plate and at sides of hole.

No. 460.

Duplicate of No. 459.
Thickness of plate, ".243.
Compression area, ".243 × ".625 = .152 square inch.

Loads applied.	Elongation of hole.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
5,000	.0095	
6,000	.0140	
7,000	.0185	
7,500	.0208	
8,000	.0230	
8,500	.0259	
9,000	.0288	
9,500	.0320	
10,000	.0375	
10,500	.0420	
11,000	.0490	
11,500	.0570	
12,000	.0653	
12,500	.0748	
13,000	.0888	Ultimate strength = 85,520 pounds per square inch compression.

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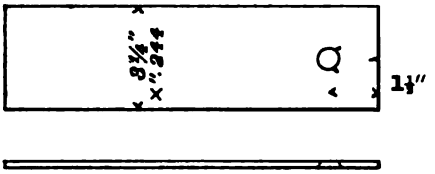
No. 461.



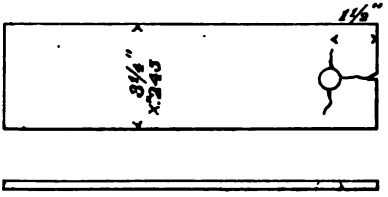
Compression area, ".244×".625 = .153 square inch.

Loads applied.	Elongation of hole.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
5,000	.0110	
6,000	.0142	
7,000	.0170	
8,000	.0208	
8,500	.0230	
9,000	.0252	
9,500	.0280	
10,000	.0310	
10,500	.0340	
11,000	.0380	
11,500	.0410	
12,000	.0470	
12,500	.0515	
13,000	.0575	
13,500	.0640	
15,500	.....	Ultimate strength = 101,310 pounds per square inch compression.

Test discontinued soon as maximum load was passed.
Fractures started at edge of plate, also at sides of punched hole.

No. 462.

Duplicate of No. 461.



Compression area ".245×".625 = .153 square inch.

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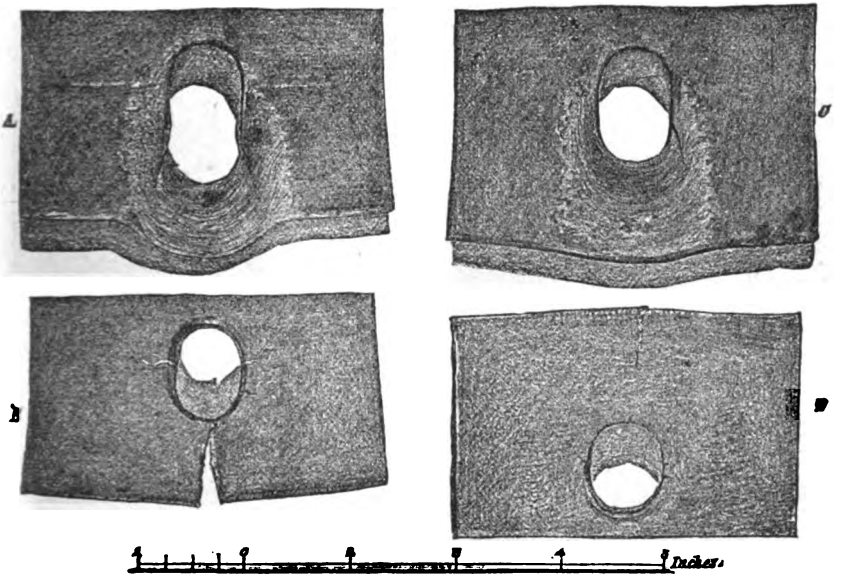
Loads applied.	Elongation of hole.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
5,000	.0175	
6,000	.0208	
7,000	.0250	
8,000	.0295	
8,500	.0315	
9,000	.0340	
9,500	.0368	
10,000	.0390	
10,500	.0428	
11,000	.0465	
11,500	.0502	
12,000	.0550	
12,500	.0605	
13,000	.0670	
13,500	.0742	
14,000	.0830	
14,500	.0938	
15,000	.1070	
15,500	.1260	
15,745	.1490	Ultimate strength = 102,910 pounds per square inch compression.

Fractures developed as shown by sketch.

Resistance of steel and iron plates to tearing out at rivet holes.

$\frac{1}{2}$″ STEEL PLATE, PLANED ENDS.



$\frac{1}{2}$″ IRON PLATE, PLANED ENDS.

Fractures in plates having $\frac{11}{16}$″ punched holes.
$1\frac{1}{4}$″ from center of hole to end of Plates *A* and *B*.
$1\frac{1}{2}$″ from center of hole to end of Plates *C* and *D*.

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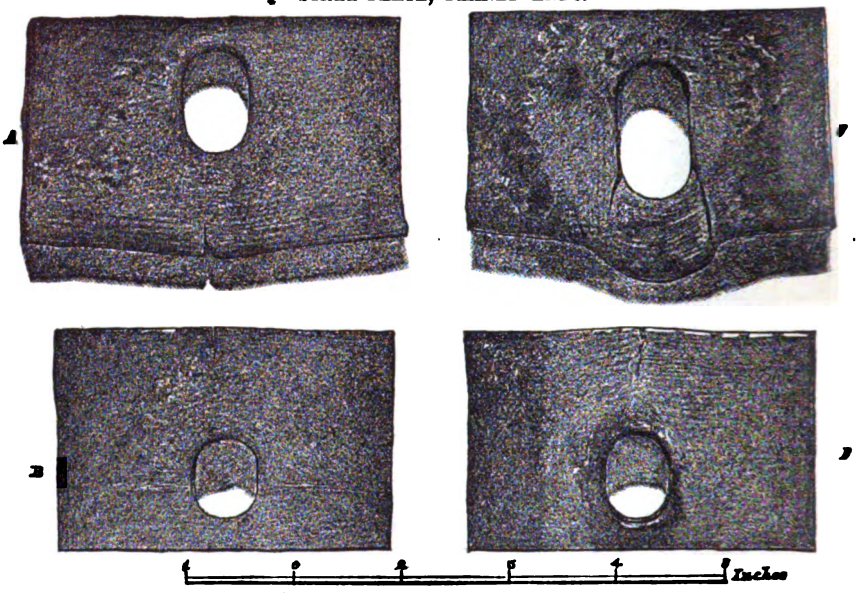
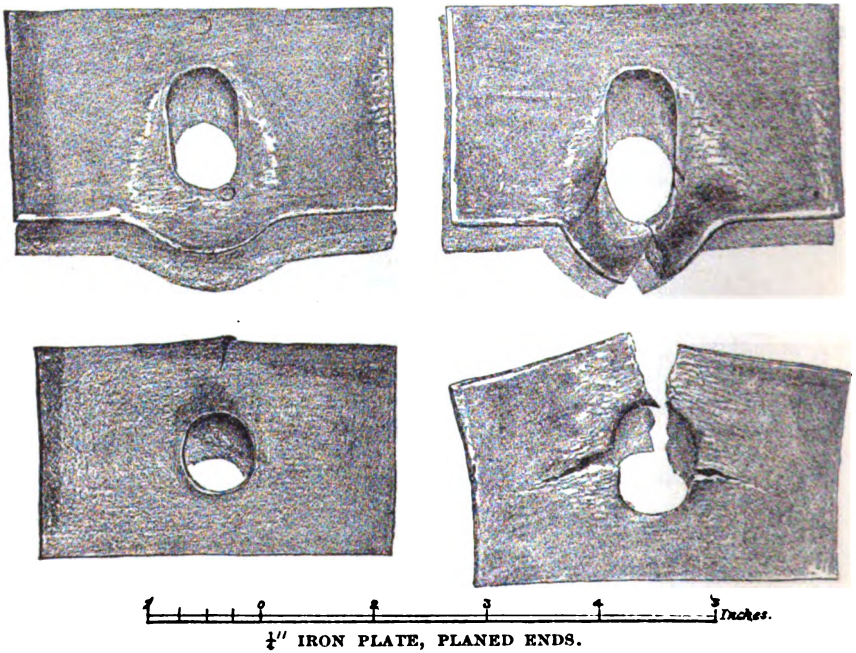
$\frac{1}{2}$″ STEEL PLATE, PLANED ENDS.



$\frac{1}{2}$″ IRON PLATE, PLANED ENDS.

Fractures in plates having $\frac{11}{16}$″ punched holes.
$1\frac{1}{2}$″ from center of hole to end of Plates *A* and *B*.
$1\frac{1}{4}$″ from center of hole to end of Plates *C* and *D*.

$\frac{1}{2}$′ STEEL PLATE, PLANED ENDS.



$\frac{1}{2}$″ IRON PLATE, PLANED ENDS.

Fractures in plates having $\frac{5}{8}$″ drilled holes.
1″ from center of hole to end of plate.

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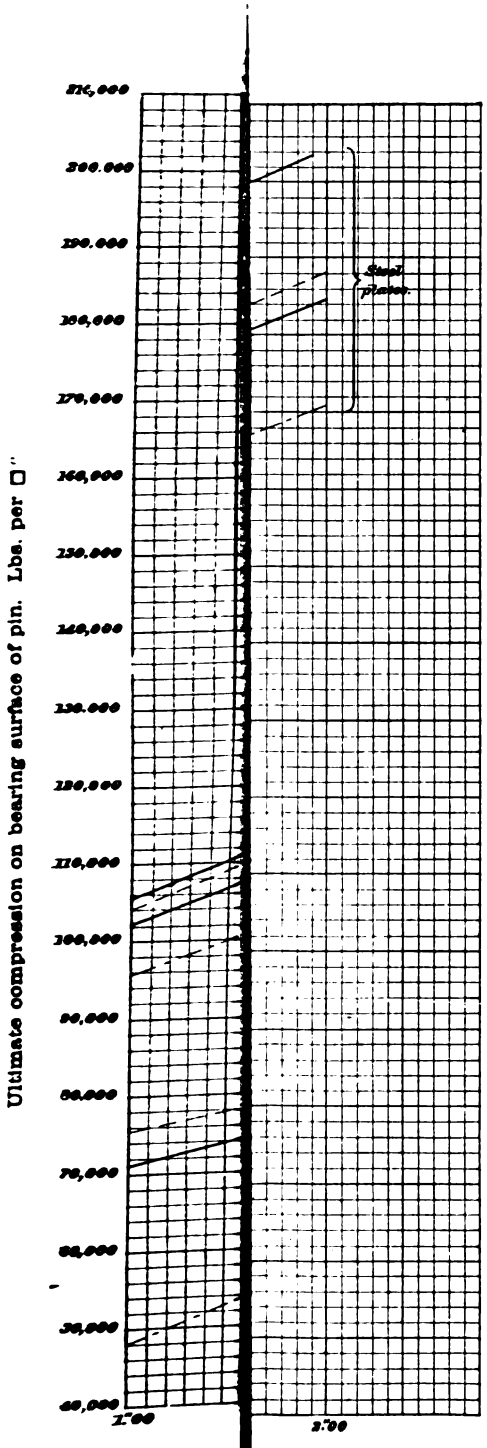

S. Ex. 1

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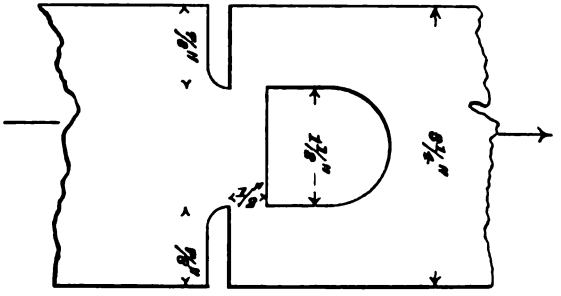
¼″ Wrought-iron Plate.

(Shearing parallel to grain.)

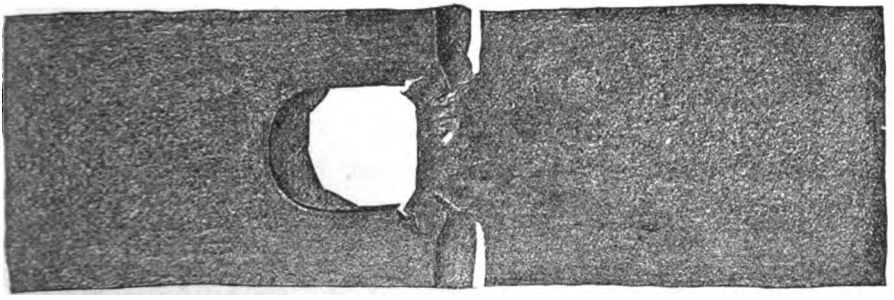
No. 300.

FORM OF SPECIMEN.



Shearing area, ″.5×″.276×2 = .276 square inch.
Ultimate strength, 7,728 pounds = 28,800 pounds per square inch.

SPECIMEN AFTER FRACTURE.

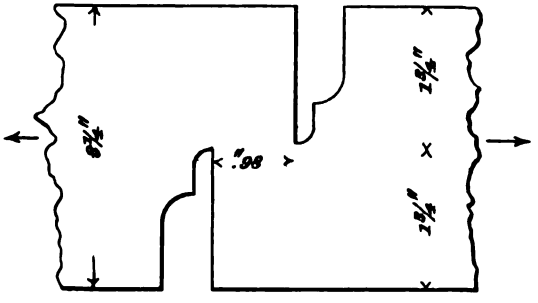


No. 301.

Same form as No. 300.
Shearing area, ″.50×″.278×2 = .278 square inch.
Ultimate strength, 7,850 pounds = 28,240 pounds per square inch.
Failed same manner as No. 300.

No. 302.

FORM OF SPECIMEN.



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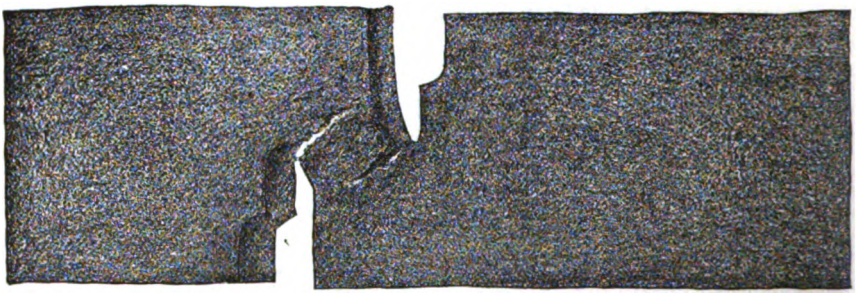
SPECIMEN AFTER FRACTURE.



Shearing area, ".98×".279 = .273 square inch.
Ultimate strength, 6,900 pounds = 25,270 pounds per square inch.

No. 303.

Same form as No. 302.
Shearing area, ".98×".276 = .270 square inch.
Ultimate strength, 6,980 pounds = 25,290 pounds per square inch.
Failed in the same manner as No. 302.

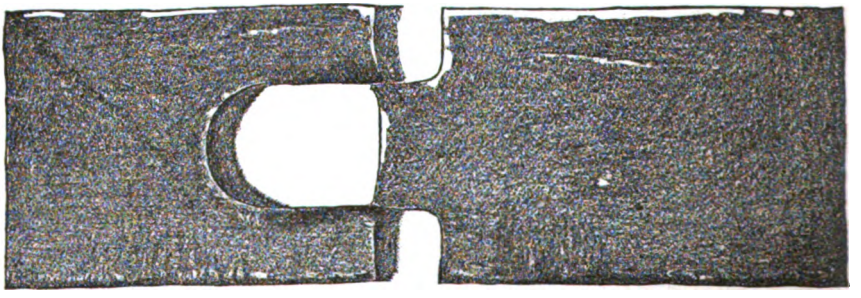
¼" STEEL PLATE.

(Shearing parallel to direction of rolling.)

No. 318.

Original form of specimen same as No. 300.

SPECIMEN AFTER FRACTURE.



Shearing area, ".50×".245× 2 = .245 square inch.
Ultimate strength, 9,450 pounds = 38,570 pounds per square inch.

No. 319.

¼" steel, same form as No. 318.
Shearing area, ".50×".249×2 = .249 square inch.
Ultimate strength, 10,120 pounds = 40,640 pounds per square inch.
Tore out evenly at each shearing line.

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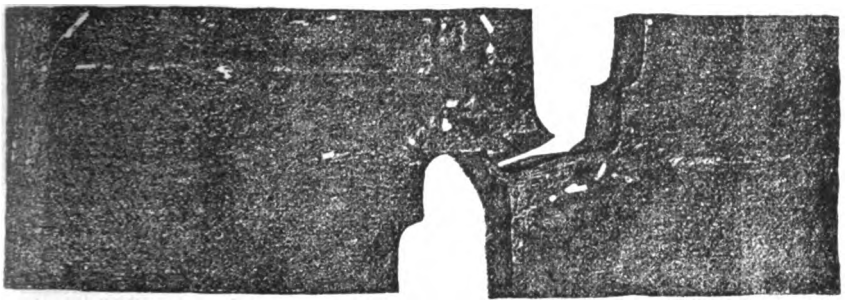
No. 320.

¼″ STEEL PLATE.

Original form of specimen same as No. 302.

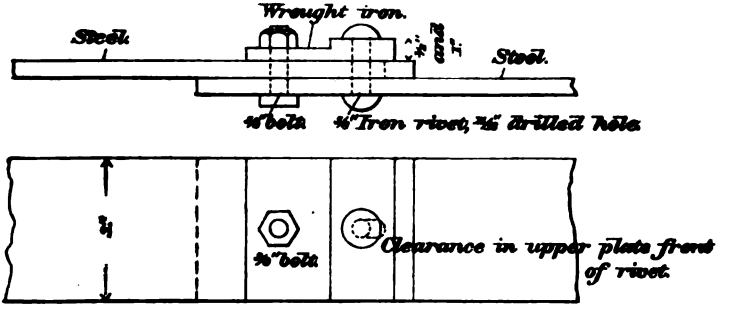
SPECIMEN AFTER FRACTURE.



Shearing area, 1″ × ″.255 = .255 square inch.
Ultimate strength, 9,200 pounds = 36,080 pounds per square inch.
Failed by shearing from bottom of groove to bottom of groove, one line of shearing.

DETAILS OF RIVETED JOINTS—FRICTION OF RIVETS.

Experiments to determine the force necessary to slip a joint or plates held together by the friction of the rivet only.



Gauge measures elongations in 10″ section, including the joint. The ⅝″ bolt used to hold washer in place while riveting removed before the test.

No. 463.

Thickness of steel plates, ″.31 each; width, about 3″.
Thickness of washer ″.50.
Length of rivet under heads, 1″.12.

Loads applied.	Elongation.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
2,000	.0003	
3,000	.0006	
4,000	.0013	
5,000	.0020	Slipping began at 5,400 pounds.
5,500	.0092	

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No. 463.

Maximum resistance, 5,980 pounds a load, which was reached and held momentarily.

It seems quite probable that the available resistance offered by the friction of the rivet was 5,400 pounds.

The joint was found oily after shearing the rivet.

Rivet sheared between steel plates at about 14,000 pounds.

No. 464.

Thickness of steel plates, ".30 each.

Thickness of washer, ".50.

Total length of rivet under heads, 1".10.

Shearing area of rivet, .371 square inch.

Loads applied.	Elongation.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
2,000	.0005	
3,000	.0008	
4,000	.0016	
5,000	.0019	
5,500	.0024	
5,950	.0098	Rapid slipping.
64,000	.....	Maximum load reached.
15,650	.....	Shearing strength of rivet=42,180 pounds per square inch.

Joint oily. Sheared the rivet between steel plates and started off rivet head slightly. Hole in lower steel plate elongated about ".01.

No. 465.

Thickness of steel plates, ".30, ".28; thickness of washer, 1".

Length of rivet under heads, 1".58.

Loads applied.	Elongation.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
2,000	.0002	
3,000	.0007	
4,000	.0011	
4,800	.0012	
	.0034	Sudden slip. This load considered the limit of friction between the plates. Unaffected by cutting of the surface in contact.
5,000	.0052	
5,500	.0083	
6,000	.0100	
6,500	.0112	
7,000	.0128	
7,480	.0162	Rapid slipping takes place.
8,000	.0661	
8,500	.1112	
9,000	.1522	
10,000	.2032	
11,000	.2134	
12,000	.2282	
13,000	.2472	
15,900	.....	Ultimate strength of rivet=42,830 pounds per square inch.

The peculiar behavior of the above specimen thought to be due to a burr on the upper plate cutting the under plate, which would increase the resistance after first slipping took place.

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No. 466.

Thickness of steel plate, ".30 each; thickness of washer, 1".
Length of rivet, 1".60.

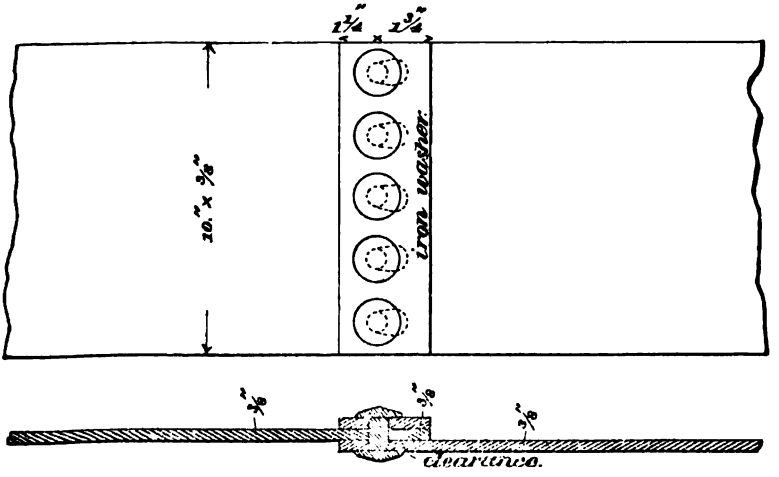
Loads applied.	Elongation.	Remarks.
Pounds.	*Inch.*	
1,000	0.	
2,000	.0002	
3,000	.0008	
4,000	.0016	
5,000	.0038	
5,500	.0056	This load considered sufficient to overcome the friction caused by the rivet when unaffected by the cutting of the surfaces in contact.
6,000	.0115	
7,000	.0210	
8,000	.0510	
8,500	.1690	
8,900	.....	Maximum resistance due to friction of rivet.
12,800	.....	Ultimate shearing strength of rivet = 37,180 pounds per square inch.

Plates cut same as in experiment No. 465.

Friction of rivets.

No. 248.

$\frac{3}{8}$" IRON PLATE.



Five $1\frac{1}{8}$" iron rivets.
Five $\frac{3}{4}$" drilled holes, with clearance front of rivets in upper plate.
This specimen made up of plates in test F . . clamped with 20" exposure between holder faces; corners of holes rounded about ".05.
Shearing area of five rivets ($\frac{3}{4}$" diameter), 2.21 square inches.

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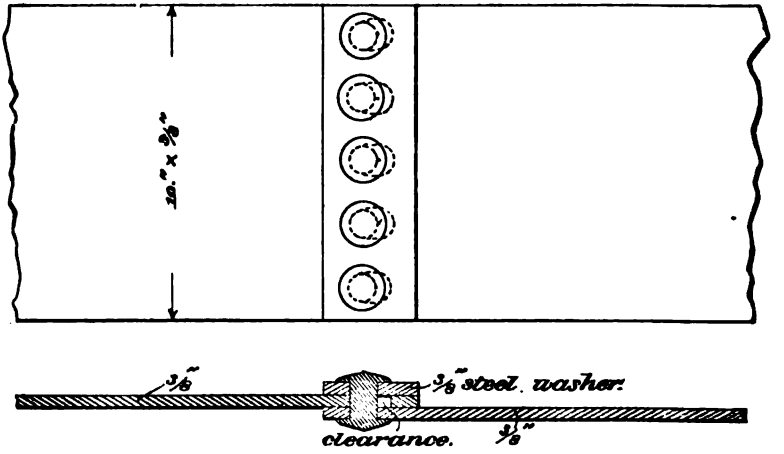
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.	.....	
10,000	.0008	.....	
15,000	.0018	.....	
20,000	.0030	.....	
25,000	.0050	.....	
27,000	.0068	.....	
28,000	.0075	.....	
29,000	.0090	.....	
30,000	.0108	.....	
5,000	.....	.0058	
31,000	.0130	.....	Rapid slipping began when load passed 31,000 pounds. The resistance to slipping continued about 30,000 pounds, till total slip was ".15.
32,000	.15	.....	
35,000	.18	.....	Friction per rivet, $\frac{31,000}{4}$ = 6,200 pounds.
40,000	.26	.....	
45,000	.32	.....	
50,000	.35	.....	
55,000	.36	.....	
60,000	.38	.....	
65,000	.40	.....	
70,000	.41	.....	
75,000	.45	.....	
80,000	.47	.....	Shearing strength of rivets, 41,630 pounds per square inch.
85,000	.54	.....	
90,000	.65	.....	
92,000	.....	.....	Ultimate strength. Sheared rivets.

Under plate cut vicinity of rivet holes by upper plate slipping over it.

$\frac{3}{8}$" Steel Plate.



Five $\frac{11}{16}$" iron rivets; $\frac{3}{4}$" drilled holes.
Clearance given rivets in upper plates.
Corners of rivet holes rounded about ".05.
Shearing area five rivets ($\frac{3}{4}$" diameter), 2.21 square inches.

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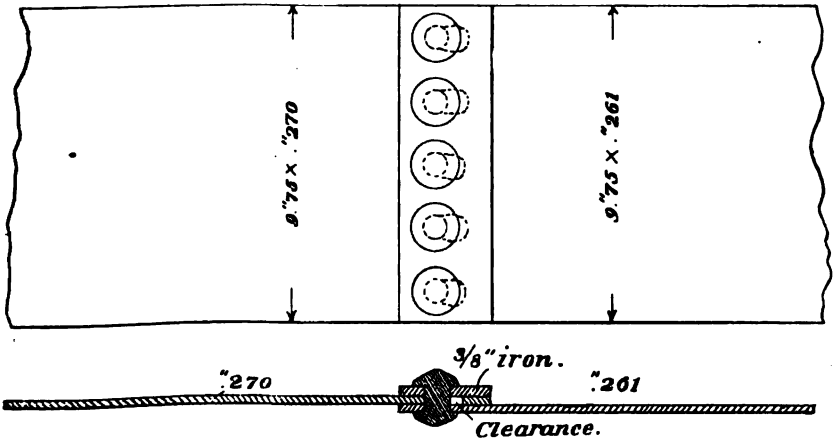
Loads applied.	Elongation in 10 inches.	Remarks.
Pounds.	*Inch.*	
5,000	0.	
10,000	.0010	
12,000	.0115	
14,000	.0020	
16,000	.0022	
18,000	.0028	
20,000	.0030	
22,000	.0035	
24,000	.0041	
26,000	.0048	
28,000	.0065	
30,000	.0100	
31,000	.0121	Slipping continued, the resistance falling to 28,000 pounds.
31,000	.180	
32,000	.185	
33,000	.19	Friction per rivet, $\frac{\text{slips}}{2}$ = 6,200 pounds.
34,000	.22	
35,000	.23	
40,000	.32	
45,000	.36	
50,000	.375	
55,000	.385	
60,000	.40	
65,000	.425	
70,000	.445	
75,000	.47	
80,000	.49	
85,000	.54	
88,000	.....	Ultimate strength. Sheared rivets.

Shearing strength of rivets = 39,820 pounds per square inch.

No. 250.

$\frac{1}{4}$" IRON PLATE.



Five $\frac{5}{8}$" iron rivets; drilled holes ".69 diameter.
Corners of rivet holes rounded about ".05.
Shearing area of rivets (5 = ".69 diameter), 1.87 square inches.

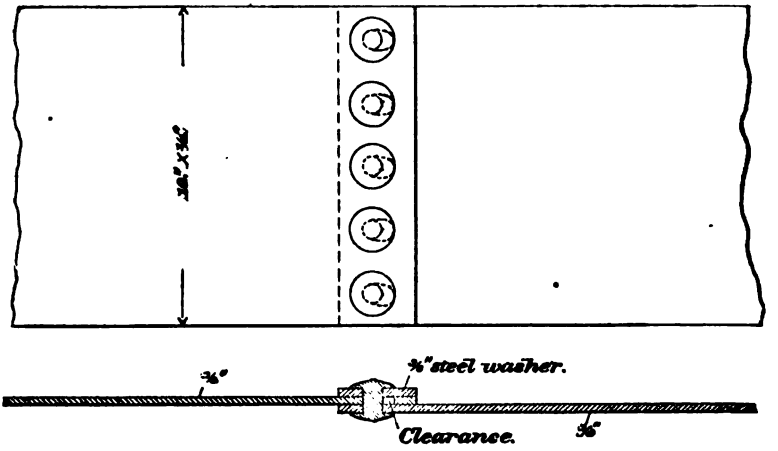
Digitized by Google

Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.	.....	
10,000	.0015	.....	
12,000	.0020	.....	
14,000	.0025	.....	
16,000	.0032	.....	
18,000	.0040	.....	
20,000	.0050	.....	
21,000	.0058	.....	
22,000	.0065	.....	
23,000	.0070	.....	
24,000	.0080	.....	
25,000	.0092	.....	
5,000	.....	.0045	
26,000	.0110	.....	Friction per rivet, $\frac{26}{5}\frac{21}{20} = 5{,}200$ pounds.
27,000	.1230	.....	
28,000	.1260	.....	
29,000	.1410	.....	
30,000	.1520	.....	
35,000	.220	.....	
40,000	.25	.....	
45,000	.29	.....	
50,000	.32	.....	
60,000	.37	.....	
70,900	.....	.....	Sheared rivets.

Shearing strength of rivets = 37,914 pounds per square inch.

No. 251.

$\frac{1}{4}$″ Steel Plate.



Five $\frac{5}{8}$″ iron rivets (Burden's); drilled holes, ".69 diameter.
Rivet holes rounded about ".05.
Shearing area of rivets, 1.87 square inches.

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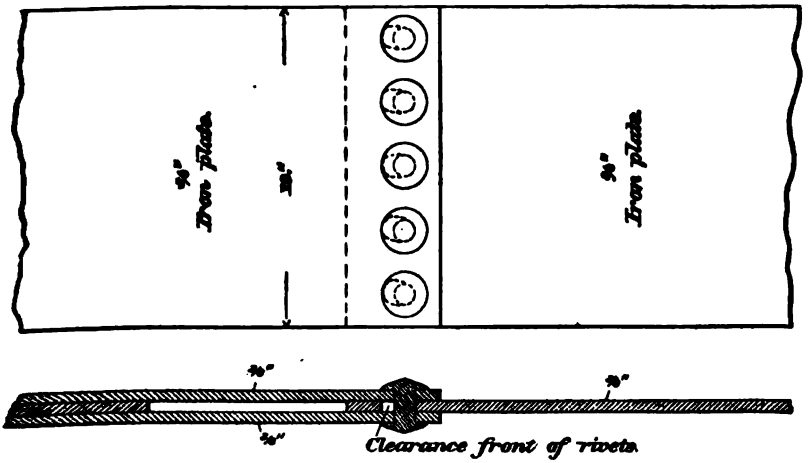
Loads applied.	Elongation in 10 inches.	Permanent set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
5,000	0.		
10,000	.0010		
12,000	.0013		
14,000	.0028		
16,000	.0032		
5,000		0.0008	
16,000	.0032		
18,000	.0040		
20,000	.0050		
5,000		.0020	
21,000	.0058		
22,000	.0062		
23,000	.0070		
24,000	.0078		
25,000	.0082		
26,000	.0090		$\frac{21}{32}\frac{29}{32}$ = 5,400 pounds sudden slip.
27,000	.0100		
28,000	.0128		
29,000	.0132		
30,000	.0162		Friction per rivet, $\frac{29}{32}\frac{31}{32}$ = 6,000 pounds.
31,000	.0640		
32,000	.0710		
33,000	.0935		
34,000	.0990		
35,000	.1660		
36,000	.172		
37,000	.182		
40,000	.260		
45,000	.295		
50,000	.325		
60,000	.380		
72,700			Sheared the rivets.

Shearing strength of rivets, 38,880 pounds per square inch.

No. 636.

$\frac{3}{8}$" IRON PLATE.

FRICTION OF RIVETS.



Five $\frac{3}{4}$" iron rivets; drilled holes, ".81 diameter.

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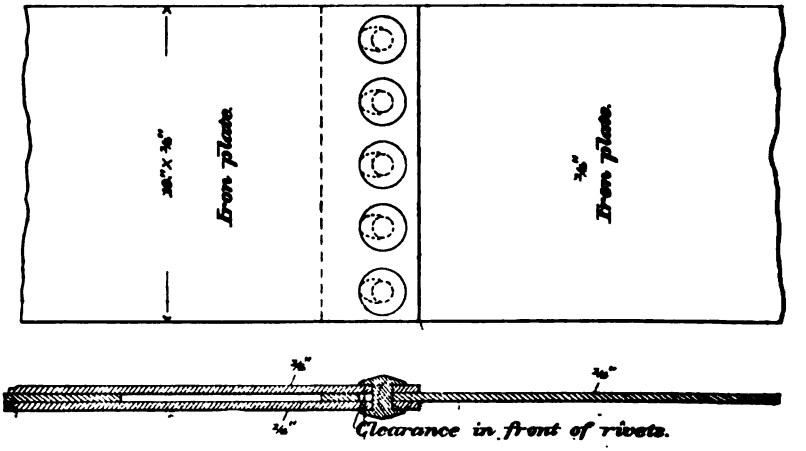
Loads applied.	Elongation in 10 inches.	Remarks.
Pounds.	*Inch.*	
5,000	0.	
10,000	0.	
15,000	.0005	
20,000	.0008	
25,000	.0010	
30,000	.0018	
33,000	.0020	
35,000	.0022	
38,000	.0028	
40,000	.0030	
42,000	.0032	
44,000	.0038	
46,000	.0040	
48,000	.0048	
50,000	.0069	
52,000	.3470	Sudden slip of plates.

10,400 pounds friction per rivet.

No. 637.

¼″ IRON PLATE.

FRICTION OF RIVETS.



Five $\frac{11}{16}$″ iron rivets; drilled holes, $\frac{3}{4}$″ diameter.

Loads applied.	Elongation in 10 inches.	Remarks.
Pounds.	*Inch.*	
5,000	0.	
10,000	0.	
20,000	.0008	
30,000	.0020	
38,000	.0108	Rapid slipping of plates.

7,600 pounds friction per rivet.

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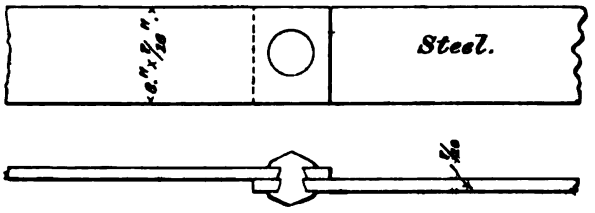
SHEARING OF STEEL RIVETS.



No. 467.

FIRST RIVET.

$1\frac{1}{8}$" steel rivet. (Kind of steel not known.)
Punched holes: Punch, ".753 diameter; die, ".774 diameter.
Shearing area of rivet, .45 square inch.
Ultimate shearing strength, 25,750 pounds = 57,220 pounds] per square inch.

No. 468.

SECOND RIVET.

Ultimate shearing strength, 26,490 = 58,870 pounds per square inch.

ANALYSIS OF IRON, STEEL, ETC.

[Made by Capt. JOHN PITMAN, Ordnance Department.]

10" RODMAN GUNS, Nos. 362 AND 363.

	No. 362.	No. 363.	Difference.
	Per cent.	*Per cent.*	*Per cent.*
Silicon	1.765	1.750	0.015
Phosphorus	0.144	0.130	0.014
Sulphur	0.109	0.098	0.011
Manganese	0.500	0.433	0.067
Copper	0.034	0.036	0.002
Cobalt	0.016	0.008	0.008
Nickel	0.010	0.015	0.005
Combined carbon	0.559	0.697	0.138
Graphite	2.432	2.130	0.302
Total carbon	2.991	2.827	0.164

STEEL PLATES USED FOR EXPERIMENTS ON RIVETED JOINTS.

	$\frac{1}{2}$" steel.	$\frac{5}{8}$" steel.	$\frac{3}{4}$" steel.
	Per cent.	*Per cent.*	*Per cent.*
Carbon	0.115	0.126	0.130

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STEEL BARS.

[Supposed to be alike.]

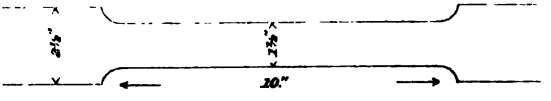
	Carbon.		Carbon.	Tensile strength per square inch.
				Pounds.
No. 1	0.178	Duplicate	0.187	60,445
No. 2	0.087	do	0.094	60,185
No. 3	0.553	do	0.565	74,896+
No. 4	0.180	do	0.188	63,230
No. 5	0.234	do	0.210	62,640
No. 6	0.128	do	0.129	59,730
No. 7	0.174	do	0.183	66,060
No. 8	0.198	do	0.208	59,545
No. 9	0.172			59,760

BRONZE, ETC.

	Copper.	Nickel and cobalt.	Zinc.	Tin.	Iron.	Antimony.	Arsenic.	Lead.	Bismuth.	Silver.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Hub from cavalry forge wheel	86.35	.....	3.56	9.94	0.040	.....	.....	0.130	0.010	.....
Alloy from Rock Island	0.175	0.157	0.020	0.438	0.150	5.905	0.041	93.000	0.052	Trace.
Brazing Wood bridge gun	58.85	.....	.....	.....	.....	.....	.....	.....	.....	.....
Trunnion Wood bridge gun	3.53	.....	.....	.....	92.64	.....	.....	.....	.....	.....
Crab obelisk	91.08	.....	.....	8.33	0.09	.....	.....	.....	.....	.....

Tensile test of wrought iron used in spliced specimens Nos. 607, 608, 609, *and* 610.

FORM OF TENSILE SPECIMENS.



Number of test.	Mark on specimen.	Size of specimen.		Sectional area.	Elastic limit.		Ultimate strength.	
		Thickness.	Width.		Actual pounds.	Pounds per square inch.	Actual pounds.	Pounds per square inch.
		Inch.	*Inch.*	*Square inch.*				
605	C	.388	1.500	.5820	20,200	34,708	28,500	48,970
606	R	.373	1.503	.5606	18,050	32,200	24,100	42,990

Number of test.	Elongation in 10 inches.	Uniform elongation.	Area at fracture.	Contraction of area.	Appearance of fracture.
	Per cent.	*Per cent.*	*Square inch.*	*Per cent.*	
605	10.5	9	.34 × 1.47=.4998	14.1	Fibrous lamellar.
606	6.9	6	.34 × 1.44=.4896	12.7	Do.

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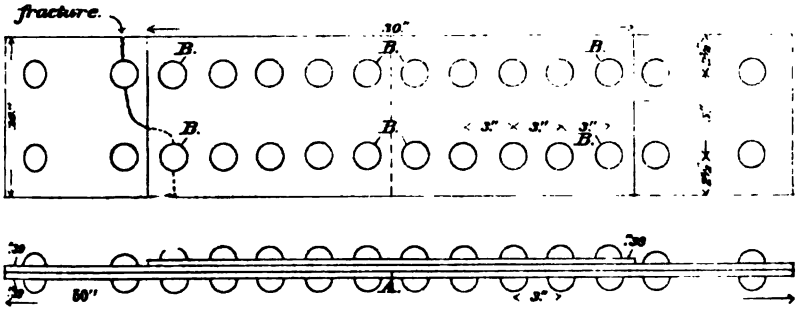
No. 607.

Tensile test of $\frac{3}{8}$″ × 10″ wrought-iron spliced plates.



$\frac{13}{16}$″ iron rivets, "Burden's best."
$\frac{7}{8}$″ drilled holes.

No. 607.

Gross sectional area of two spliced plates ″.78 × 10″ = 7.8 square inches.
Net sectional area of two spliced plates, ″.78 × 8″.25 = 6.44 square inches.

Under load of 80,000 pounds, joint *A* of under spliced plate opened perceptibly.

While sustaining 150,000 pounds a straight edge 24″ long was placed on the welt and deflection of ″.13 at middle found, plates being concave on the side of the welt at 170,000 pounds tension. Joint *A* had opened from ″.03 to ″.04. At this load scale had started on rivet-heads *B* on sides towards middle of specimen. A load of 210,000 pounds was applied and then reduced to zero load, leaving a permanent deflection of ″.20 at middle, as measured from a 24″ straight edge.

Ultimate strength of plates, 258,500 pounds, fracturing specimen at end rivet in welt on one side and at first rivet beyond welt on the other side of the plates.

Fracture fibrous lamellar.

Maximum strain on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plates	33,141
Tensile strain on net section of plates	40,140

No. 608.

Duplicate of No. 607.

Gross sectional area of spliced plates, ″.76 × 10″ = 7.6 square inches.
Net sectional area of spliced plates, ″.76 × 8″.25 = 6.27 square inches.

Loads applied.	Remarks.
Pounds.	
50,000	Deflection at middle, ″.03, measured from 24″ straight edge.
100,000	Deflection at middle, ″.07, measured from 24″ straight edge.
150,000	Deflection at middle, ″.11, measured from 24″ straight edge.
200,000	Deflection at middle, ″.17, measured from 24″ straight edge.
0	Deflection at middle, ″.11, measured from 24″ straight edge.
250,000	Deflection at middle, ″.27, measured from 24″ straight edge.
279,100	Ultimate strength.

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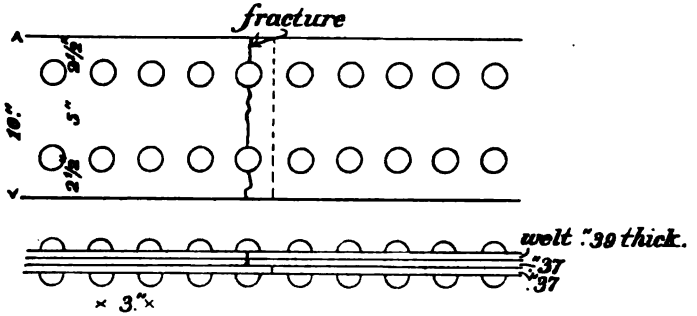
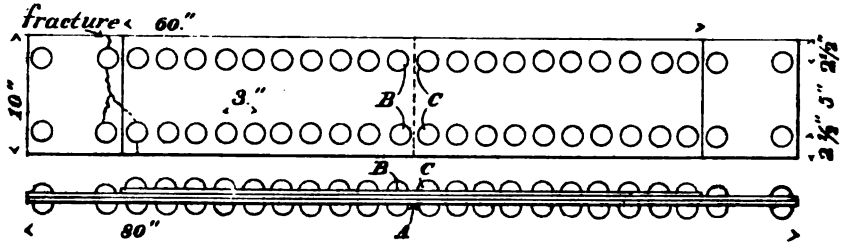
Fractured the continuous plate and the welt at the middle of the specimen at the first rivets from joint.



Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plates	36,724
Tensile strain on net section of plates	44,514

No. 609.



Nominal thickness of plates, $\frac{3}{8}$".
$\frac{13}{16}$" iron rivets, "Burden's best"; $\frac{7}{8}$" drilled holes.
Gross sectional area of spliced plates, ".73×10" = 7.3 square inches.
Net sectional area of spliced plates, ".73×8".25 = 6.02 square inches.

Loads applied.	Remarks.
Pounds.	
50,000	Deflection at middle, ".02, measured from 24" straight edge.
100,000	Deflection at middle, ".04, measured from 24" straight edge.
150,000	Deflection at middle, ".06, measured from 24" straight edge.
200,000	Deflection at middle, ".07, measured from 24" straight edge.
240,000	Deflection at middle, ".06, measured from 24" straight edge.
254,800	Ultimate strength.

Fractured plate in the same manner as No. 607; failed.

Plates began to tear at rivet holes after the joint *A* was open ".20, the result of the distortion of the joint and the stretch of the welt and continuous plate for the section between rivets *B* and *C*.

Maximum loads on joint.

	Pounds per sq. inch.
Tensile strain on gross section of plates	34,900
Tensile strain on net section of plates	42,325

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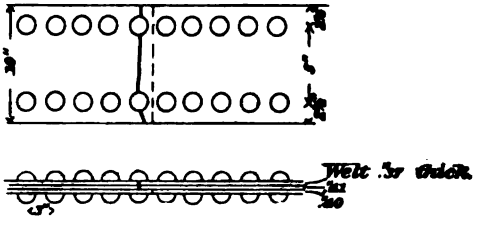
No. 610.

Duplicate of No. 609.
Gross sectional area of spliced plates, $''.81 \times 10'' = 8.1$ square inches.
Net sectional area of spliced plates, $''.81 \times 8''.25 = 6.68$ square inches.

Loads applied.	Remarks.
Pounds.	
50,000	Deflection at middle, ".02, measured from 24" straight edge.
100,000	Deflection at middle, ".04, measured from 24" straight edge.
150,000	Deflection at middle, ".05, measured from 24" straight edge.
200,000	Deflection at middle, ".08, measured from 24" straight edge.
246,000	Deflection at middle, ".10, measured from 24" straight edge.
273,200	Ultimate strength.

Fractured continuous plate and welt at middle of specimen at first rivets from joint.



Maximum loads on joint.

	Pounds per sq. inch
Tensile strain on gross section of plates	33,728
Tensile strain on net section of plates	40,898

Tensile tests of old boiler joints.

$\frac{3}{8}''$ WROUGHT IRON PLATE.

Specimens taken from the cylindrical part of a locomotive boiler which had been in service twenty-four years.
Diameter of shell, 52".
Steam pressure carried, 130 pounds per square inch.
Tensile test-piece No. 80 cut out crosswise the grain.
Joints Nos. 89, 90, and 91 tested lengthwise the grain of the iron.

No. 80.

Sectional area, $1''.500 \times ''.385 = .577$ square inch.
Elastic limit, 13,600 pounds = 23,570 pounds per square inch.
Ultimate strength, 26,200 pounds = 45,410 pounds per square inch.
Elongation, 1".34 in 10" = 13.4 per cent.
Uniform elongation, 10 per cent.
Area at fracture, $1''.37 \times ''.32 = .438$ square inch.
Contraction of area, 24.1 per cent.
Appearance of fracture fibrous, with marked lamination.

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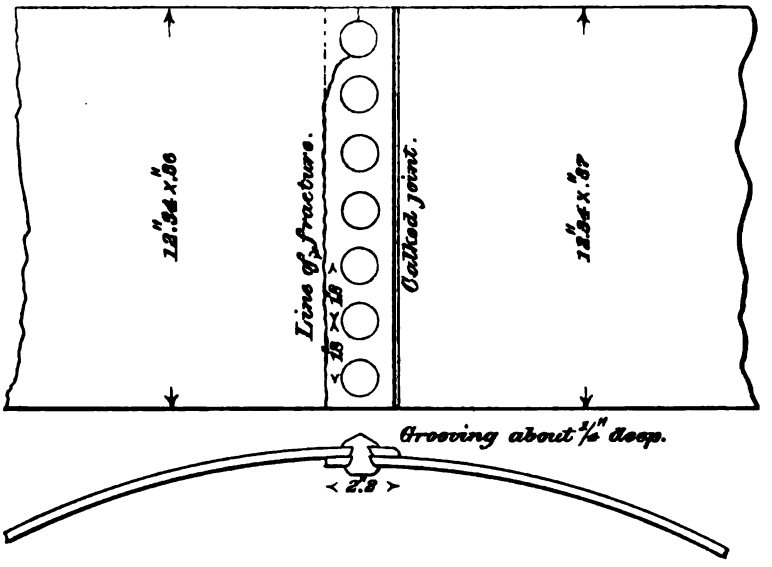
No. 89.

OLD BOILER PLATE JOINT, $\frac{3}{8}$" WROUGHT IRON.



⅞" Iron rivets. Hand driven. Punched holes.

The curve of the joint (conforming to the curvature of the shell of the boiler, 52" diameter) was not straightened before placing in the testing machine. At 10,000 pounds tension the plate had straightened so as to open the crack where grooving had taken place. This crack did not appear before placing the specimen in the machine, as it followed the edge of the overlapping plate in part, and for part of its course was covered by the overlapping plate. As strains were increased this crack gradually opened. At 59,700 pounds tension snapping sounds were heard, which were heard frequently till the ultimate strength was determined.

Ultimate strength, 84,300 pounds.

Fracture occurred along the line where grooving had taken place, a distance of 10", then turning in its course slightly and tearing through the end rivet hole. Appearance of fracture dull, fibrous, and fine granular. The minimum thickness of metal at bottom of grooving was about ".06. The average thickness about ".09 for 10" length.

The area of fractured plate probably about 1.6 square inches.

The pull exerted by the machine tending to straighten the joint may have caused a more unfavorable effect on the plate and caused earlier ailure than would have been the case when the plate was in the boiler, he plate fracturing under the combined tensile and bending strains.

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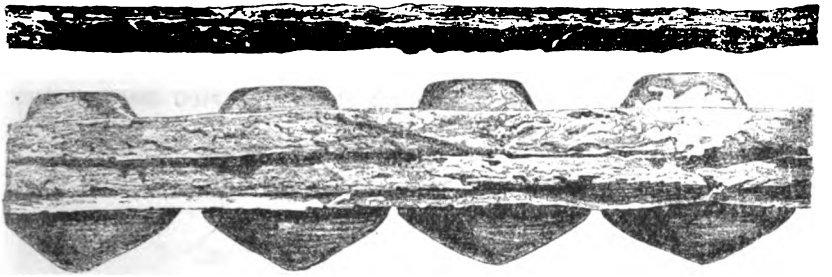
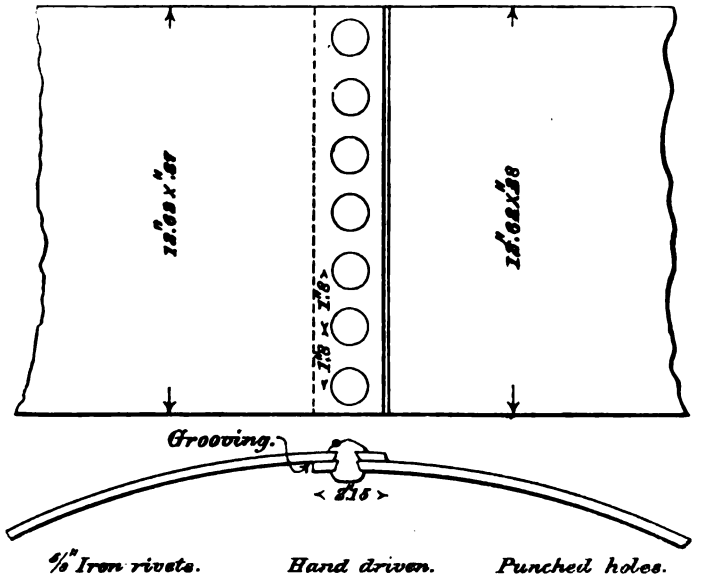


No. 90.

OLD BOILER PLATE JOINT, $\frac{3}{8}$" WROUGHT IRON.



Snapping sound heard at 56,000 pounds tension.

Ultimate strength, 83,500 pounds. Sheared rivets.

This joint was cleaned and carefully examined before the test was made to detect evidence of grooving, if any had taken place.

The inspection did not reveal any cracks from grooving. When, however, a tensile strain of 50,000 pounds had been reached, the grooving cracks appeared.

After having sheared the rivets in the first test of this joint, the grooved plate was placed in the testing machine and strains applied so as to fracture the plate through the grooving. This was accomplished by a tensile strain of 206,500 pounds.

The grooving had extended to an average depth of ".07. The appearance of the fractured metal was fibrous, with very marked lamination.

The head of a rivet was fractured, showing a granular appearance.

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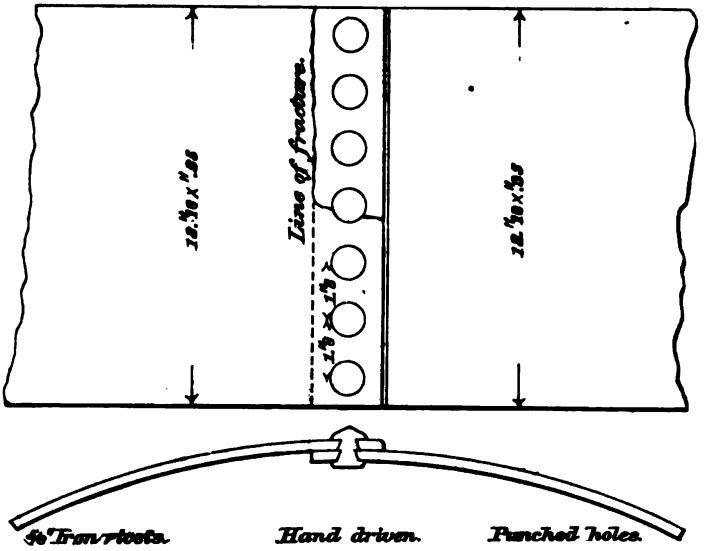
No. 91.

OLD BOILER PLATE.



Before placing this joint in the testing machine it was cleaned and carefully inspected, and by means of a scratch-awl grooving was detected in three places, having an aggregate length of $4\frac{3}{4}$″. An opinion at this time could not be formed as to the depth of the grooving. The cracks could not be followed with the point of the awl beyond the distance of $4\frac{3}{4}$″.

When a tensile strain was applied and the joint began to straighten, the grooving opened a length of 12″. Ultimate strength of joint, 84,200 pounds. Sheared five rivets and tore the plate along the line of grooving 6″, and through a rivet hole to the end of the lap. Maximum depth of grooving, ″.28.

From the fact that more than half the length of the grooving could not be seen before the test was made, it would appear very probable that cases of grooving exist that are wholly covered by the overlapping plate, and its presence even after a careful examination of the boiler is unsuspected.

The plate fractured with a fibrous appearance, slightly granular.

Appearance of fractured plate, Joint No. 91.

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Tensile tests of single and double refined wrought iron.

ROUND BARS.

(Single refined bars from the Passaic Rolling Mill Company, Paterson, N. J.)

[FORM OF SPECIMENS.]

No. 593.

Mark on bar, S. 18.
Diameter, 2″.01.
Sectional area, 3.17 square inches.
Gauged length, 80″.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,170	1,000	0.		
15,850	5,000	.0127		
31,700	10,000	.0275		
	1,000		0.	
47,550	15,000	.0425		
63,400	20,000	.0572		
	1,000		0.	
65,000		.0600		
66,000		.0608		
67,000		.0618		
68,000		.0628		
69,000		.0637		
70,000		.0650		
71,000		.0659		
72,000		.0669		
73,000		.0679		
74,000		.0690		
75,000		.0699		
76,000		.0710		
77,000		.0721		
78,000	24,600	.0733		Elastic limit.
79,000		.0748		
80,000		.0780		
81,000		.0797		
82,000		.0815		
83,000		.0829		
84,000		.0850		
85,000		.0874		
86,000		.0925		
87,000		.0945		
88,000		.0968		
90,000		.1015		
92,000		.850		Sustained load 5 minutes.
95,100	30,000	.90		
110,950	35,000	2.12		
126,850	40,000	3.82		Elongation of 10″ sections: ″.81, ″.86, ″.89, ″.88, ″.88, ″.89, ″.89, ″.87.
142,650	45,000	6.84		
154,400		12.00		
0	0			Rested 5 minutes.
157,500	49,680	15.20		Ultimate strength.
0	0	15.58		= 19.5 per cent.

Elongation of 10″ sections: 1″.67 (2″.45 at fracture), 1″.92, 1″.90, 1″.89, 1″.96, 1″.95, 1″.90.
Diameter at fracture, 1″.66; area, 2.16 square inches.
Contraction of area, 32 per cent.
Fracture fibrous, slightly granular.

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No. 594.

Mark on bar, S 19.
Diameter, 2″.01.
Sectional area, 3.17 square inches.
Gauged length, 80″.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,170	1,000	0.		
15,850	5,000	.0120		
31,700	10,000	.0260		
	1,000		0.	
47,550	15,000	.0406		
63,400	20,000	.0545		
	1,000		—.0006	
65,000		.0555		
66,000		.0563		
67,000		.0572		
68,000		.0581		
69,000		.0590		
70,000		.0600		
71,000		.0610		
72,000		.0620		
73,000		.0630		
74,000		.0640		
75,000		.0650		
76,000		.0661		
77,000		.0671		
78,000		.0681		
79,000		.0694		
80,000		.0705		
81,000		.0716		
82,000	25,870	.0729		Elastic limit.
83,000		.0745		
84,000		.0758		
85,000		.0777		
86,000		.0796		
87,000		.0813		
88,000		.0835		
89,000		.0867		
90,000		.185		Sustained load 5 minutes; stretching still going on.
95,100	30,000	1.00		
110,950	35,000	2.29		
126,800	40,000	4.06		Elongation of 10″ sections: ″.88, ″.89, ″.90, ″.90, ″.88, ″.89, ″.89, ″.85.
142,650	45,000	7.00		
156,400	49,338			Ultimate strength.
0	0	14.66		=18.3 per cent.

Elongation of 10″ sections: 1″.65, 1″.72, 1″.70, 1″.69, 1″.81, 1″.90 (2″.50 at fracture), 1″.70.
Diameter at fracture, 1″.58; area, 1.96 square inches.
Contraction of area, 38 per cent.
Fracture, fibrous.

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No. 595.

Mark on bar, S 20.
Diameter, 2″.01; sectional area, 3.17 square inches.
Gauged length, 80″.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,170	1,000	0.		
15,850	5,000	.0120		
31,700	10,000	.0270		
	1,000		—.0005	
47,550	15,000	.0424		
63,400	20,000	.0577		
	1,000		.0014	
65,000		.0597		
66,000		.0605		
67,000		.0618		
68,000		.0629		
69,000		.0639		
70,000		.0650		
71,000		.0660		
72,000		.0670		
73,000		.0681		
74,000		.0696		
75,000		.0708		
76,000		.0724		
77,000		.0735		
78,000		.0748		
79,000	24,920	.0760		Elastic limit.
80,000		.0775		
81,000		.0788		
82,000		.0805		
83,000		.0820		
84,000		.0834		
85,000		.0850		
86,000		.0868		
87,000		.0889		
88,000		.0938		
89,000		.205		Yielding continues.
95,100	30,000	1.00		
110,950	35,000	2.25		
126,800	40,000	4.10		Elongation of 10″ sections: ″.87, ″.93, ″.92, ″.93, ″.92, ″.91, ″.91, ″.90.
142,650	45,000	7.80		
154,000	48,864			Ultimate strength.
0	0	14.69		=18.4 per cent.

Elongation of 10″ sections: 1″.62 (2″.34 at fracture), 1″.75, 1″.82, 1″.81, 1″.81, 1″.75, 1″.79.
Diameter at fracture, 1″.59; area, 1.99 square inches.
Contraction of area, 37 per cent.
Appearance of fracture fibrous, with some cinder at center.

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DOUBLE-REFINED WROUGHT IRON.

No. 596.

Mark on bar, S 218.
Diameter, 2″.01; sectional area, 3.17 square inches.
Gauged length, 80″.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,170	1,000	0.		
15,850	5,000	.0119		
31,700	10,000	.0268		
	1,000		—.0009	
47,550	15,000	.0415		
63,400	20,000	.0559		
	1,000		—.0013	
65,000		.0570		
66,000		.0580		
67,000		.0590		
68,000		.0600		
69,000		.0610		
70,000		.0620		
71,000		.0630		
72,000		.0640		
73,000		.0650		
74,000		.0660		
75,000		.0670		
76,000		.0680		
77,000		.0690		
78,000	24,610	.0703		Elastic limit.
79,000		.0716		
80,000		.0729		
81,000		.0740		
82,000		.0751		
83,000		.0762		
84,000		.0777		
85,000		.0789		
86,000		.0805		
87,000		.0820		
88,000		.0833		
89,000		.0850		
90,000		.0865		
91,000		.0882		
92,000		.0902		
93,000		.0956		
94,000		.1650		
95,100	30,000	.47		
110,950	35,000	2.10		
126,800	40,000	3.75		Elongation of 10″ sections: ″.81, ″.81, ″.83, ″.84, ″.85, ″.86, ″.80, ″.81.
142,650	45,000	6.55		
158,500				Rested 3 minutes.
0	0			Ultimate strength.
160,500	50,631	16.35		=20.6 per cent.
0	0			

Elongation of 10″ sections: 1″.90, 1″.95, 2″.19, 2″.08, 2″.01, 2″.09, 1″.97, 2″.13.

Diameter at fracture, 1″.54; area, 1.86 square inches.

Contraction of area, 41 per cent.

Fracture fibrous; broke outside 80″ section, 2″ from face of holder jaws.

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No. 597.

Mark on bar, S 219.
Diameter, 2″.01; sectional area, 3.17 square inches.
Gauged length, 80″.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,170	1,000	0.		
15,850	5,000	.0124		
31,700	10,000	.0270		
	1,000		0.	
47,550	15,000	.0423		
63,400	20,000	.0566		
	1,000		0.	
65,000		.0580		
66,000		.0591		
67,000		.0600		
68,000		.0610		
69,000		.0620		
70,000		.0630		
71,000		.0640		
72,000		.0649		
73,000		.0660		
74,000		.0668		
75,000		.0675		
76,000		.0685		
77,000		.0695		
78,000		.0704		
79,250	25,000	.0718		
	1,000		.0005	
80,000		.0728		
81,000		.0740		
82,000		.0750		
83,000		.0762		
84,000		.0774		
85,000		.0785		
86,000		.0798		
87,000		.0811		
88,000		.0824		
89,000		.0840		
90,000		.0852		
91,000		.0868		
92,000		.0885		
93,000		.0902		
94,000		.0918		
95,000		.0935		
96,000		.0968		
97,000		.315*		
98,000		.97		Sustained load 5 minutes.
110,950	35,000	1.90		
126,800	40,000	3.50		Elongation of 10″ sections: ″.76, ″.76, ″.78, ″.78, ″.79, ″.80, ″.79, ″.78.
142,650	45,000	6.16		
160,500				
0	0			Rested 3 minutes.
161,400	50,915			Ultimate strength.
0	0	20.87		=25.5 per cent.

* About.

Elongation of 10″ sections: 2″.19, 2″.26, 2″.49, 2″.40 (2″.95 at fracture), 2″.90, 2″.44, 2″.72.
Diameter at fracture, 1″.50; area, 1.77 square inches.
Contraction of area, 44 per cent.
Fracture fibrous, cup-shaped.

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No. 598.

Mark on bar, S 220.
Diameter, 2″.01; sectional area, 3.17 square inches.
Gauged length, 80″.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,170	1,000	0.		
15,850	5,000	.0120		
31,700	10,000	.0270		
	1,000		.0003	
47,550	15,000	.0421		
64,400	20,000	.0570		
	1,000		.0015	
65,000		.0588		
66,000		.0600		
67,000		.0610		
68,000		.0619		
69,000		.0629		
70,000		.0640		
71,000		.0650		
72,000		.0660		
73,000		.0670		
74,000		.0680		
75,000		.0690		
76,000		.0701		
77,000		.0714		
78,000		.0725		
79,250	25,000	.0738		
	1,000		.0047	
80,000		.0750		
81,000		.0762		
82,000		.0775		
83,000		.0790		
84,000		.0803		
85,000		.0820		
86,000		.0831		
87,000		.0848		
88,000		.0869		
89,000		.0890		
90,000		.0910		
91,000		.0948		
92,000		.134		
93,000		.400		
95,100	30,000	.90*		
110,950	35,000	2.10*		
126,800	40,000	3.50*		
142,650	45,000	6.65*		Elongation in 10″ sections: ″.81, ″.82, ″.86, ″.84, ″.85, ″.86, ″.83, ″.82.
158,000				
0	0			Rested 3 minutes.
159,150	50,205			Ultimate strength.
146,000				At time of fracture.
0	0	19.00		=23.7 per cent.

*About.

Elongation of 10″ sections: 2″.10, 2″.06, 2″.21, 2″.38, 2″.39 (3″.35 at fracture), 2″.30, 2″.13.
Diameter at fracture, 1″.50; area, 1.77 square inches.
Contraction of area, 44 per cent.
Fracture fibrous, cup-shaped.

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Tensile tests of single and double refined.

WROUGHT IRON, ROUND BARS.

[From the Elmira Iron and Steel Rolling Mill Company.]

FORM OF SPECIMEN.

SINGLE REFINED BARS.

No. 599.

Mark on bar, L 8.
Diameter, 2''.03; sectional area, 3.24 square inches.
Gauged length, 80''.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,240	1,000	0.		
16,200	5,000	.0125		
32,400	10,000	.0270		
	1,000		0.	
48,600	15,000	.0422		
64,800	20,000	.0565		
	1,000		—.0009	
66,000		.0575		
67,000		.0585		
68,000		.0594		
69,000		.0604		
70,000		.0611		
71,000		.0621		
72,000		.0631		
73,000		.0640		
74,000		.0650		
75,000		.0660		
76,000		.0670		
77,000		.0680		
78,000		.0690		
79,000		.0700		
80,000		.0711		
81,000	25,000	.0721		
	1,000		—.0002	
82,000		.0739		
83,000		.0750		
84,000		.0762		
85,000		.0775		
86,000		.0787		
87,000		.0801		
88,000		.0815		
89,000		.0831		
90,000		.0843		
91,000		.0859		
92,000		.0874		
93,000		.0890		
94,000		.0909		
95,000		.0936		
96,000		.0970		
97,000		.1053		
98,000		.206		
100,440	31,000	.70		
113,400	35,000	1.50		
129,600	40,000	2.96		
145,800	45,000	5.35		Elongation of 10'' sections: ''.70, ''.70, ''.69, ''.69, ''.69, ''.68, ''.68, ''.66.
166,600				Rested 3 minutes.
0	0			Ultimate strength.
167,400	51,667			= 22 per cent.
0	0	17.6		

Elongation of 10'' sections: 2''.38, 2''.30, 2''.19 (2''.85 at fracture), 2''.15, 1''.96, 1''.96, 1''.77.

Diameter at fracture, 1''.63; area, 2.09 square inches.

Contraction of area, 36 per cent.

Appearance of fracture: Fibrous, 70 per cent.; granular, 30 per cent.

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No. 600.

Mark on bar, L 9.
Diameter, 2″.02; sectional area, 3.20 square inches.
Gauged length, 80″.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,200	1,000	0.		
16,000	5,000	.0118		
32,000	10,000	.0265		
	1,000		0.	
48,000	15,000	.0420		
64,000	20,000	.0572		
	1,000		—.0002	
66,000		.0590		
68,000		.0610		
70,000		.0630		
72,000		.0650		
74,000		.0670		
75,000		.0682		
76,000		.0693		
77,000		.0703		
78,000		.0715		
79,000		.0727		
80,000	25,000	.0740		
	1,000		.0024	
81,000		.0751		
82,000		.0765		
83,000		.0780		
84,000		.0790		
85,000		.0801		
86,000		.0815		
87,000		.0829		
88,000		.0843		
89,000		.0857		
90,000		.0873		
91,000		.0890		
92,000		.0910		
93,000		.0928		
94,000		.0950		
95,000		.0970		
96,000		.0995		
97,000		.1034		
98,000		.465		
102,200		.85		
112,000	35,000	1.45		
128,000	40,000	3.00		Elongations of 10″ sections: ″.66, ″.67, ″.68, ″.68, ″.70, ″.66, ″.65, ″.67.
144,000	45,000	5.35		Ultimate strength.
162,700	50,844			= 16.3 per cent.
0	0	13.0		

Elongations of 10″ sections: 1″.55, 1″.60 (1″.82 at fracture), 1″.68, 1″.60, 1″.56, 1″.55, 1″.54.
Diameter at fracture, 1″.78; area, 2.51 square inches.
Contraction of area, 22 per cent.
Appearance of fracture: Fibrous, 15 per cent.; granular, 85 per cent.

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No. 601.

Mark on bar, L 10.
Diameter, 2″.02; sectional area, 3.20 square inches.
Gauged length, 80″.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,200	1,000	0.		
16,000	5,000	.0125		
32,000	10,000	.0270		
	1,000		.0005	
48,000	15,000	.0421		
64,000	20,000	.0569		
	1,000		.0005	
66,000		.0586		
68,000		.0606		
70,000		.0621		
72,000		.0644		
74,000		.0660		
75,000		.0669		
76,000		.0680		
77,000		.0689		
78,000		.0700		
79,000		.0709		
80,000	25,000	.0719		
	1,000		.0007	
81,000		.0730		
82,000		.0736		
83,000		.0746		
84,000		.0757		
85,000		.0767		
86,000		.0780		
87,000		.0790		
88,000		.0800		
89,000		.0811		
90,000		.0824		
91,000		.0837		
92,000		.0854		
93,000		.0865		
94,000		.0881		
95,000		.0900		
96,000		.0916		
97,000		.0931		
98,000		.0950		
99,000		.0971		
100,000		.122		
112,000	35,000	1.20		
128,000	40,000	2.47		
144,000	45,000	4.55		Elongations of 10″ sections: ″.55, ″.56, ″.56, ″.59, ″.58, ″.59, ″.59, ″.59.
169,500				
0	0			Rested 3 minutes.
169,800	53,062			Ultimate strength at time of fracture.
152,000				= 21 per cent.
0	0	16.80		

Elongation of 10″ sections: 1″.73, 1″.89, 1″.90, 2″.12, 2″.15, 2″.58, 2″.30, 2″.10.
Diameter at fracture, 1″.56; area, 1.91 square inches.
Contraction of area, 40 per cent.
Appearance of fracture: Fibrous, 95 per cent.; granular, 5 per cent.
Broke outside 80″ section, 6″ from face of holder jaws.

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DOUBLE REFINED WROUGHT IRON BARS.

No. 602.

Mark on bar, L 208.
Diameter, 2″.02; sectional area, 3.20 square inches.
Gauged length, 80″.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,200	1,000	0.		
16,000	5,000	.0120		
32,000	10,000	.0271		
	1,000		.0020	
48,000	15,000	.0421		
64,000	20,000	.0571		
	1,000		.0020	
66,000		.0590		
68,000		.0610		
70,000		.0629		
72,000		.0650		
74,000		.0670		
75,000		.0680		
76,000		.0690		
77,000		.0700		
78,000		.0710		
79,000		.0720		
80,000	25,000	.0730		
	1,000		.0039	
81,000		.0745		
82,000		.0756		
83,000		.0768		
84,000		.0780		
85,000		.0790		
86,000		.0801		
87,000		.0815		
88,000		.0829		
89,000		.0844		
90,000		.0858		
91,000		.0871		
92,000		.0887		
93,000		.0905		
94,000		.0921		
95,000		.59		
112,000	35,000	1.78		
128,000	40,000	3.37		Elongation of 10″ sections: ″.75, ″.76, ″.77, ″.76, ″.79, ″.79, ″.79, ″.79.
144,000	45,000	6.10		
160,000				Rested 2½ minutes.
0	0			Ultimate strength.
160,500	50,156			= 22.7 per cent.
0	0	18.16		

Elongation of 10″ sections: 1″.70, 1″.88, 1″.94, 2″.14, 2″.19, 2″.40, 3″.02, 2″.84.
Diameter at fracture, 1″.53; area, 1.84 square inches.
Contraction of area, 43 per cent.
Appearance of fracture fibrous, cup-shaped.
Broke ¾″ outside gauged length, 12″ from face of holder jaws.

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No. 603.

Mark on bar, L 209.
Diameter, 2″.02; sectional area, 3.20 square inches.
Gauged length, 80″.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,200	1,000	0.		
16,000	5,000	.0125		
32,000	10,000	.0270		
	1,000		.0018	
48,000	15,000	.0416		
64,000	20,000	.0559		
	1,000		.0019	
66,000		.0575		
68,000		.0594		
70,000		.0610		
72,000		.0628		
74,000		.0646		
76,000		.0661		
78,000		.0679		
80,000	25,000	.0696		
	1,000		.0004	
81,000		.0700		
82,000		.0712		
83,000		.0721		
84,000		.0731		
85,000		.0740		
86,000		.0750		
87,000		.0760		
88,000		.0770		
89,000		.0781		
90,000		.0792		
91,000		.0809		
92,000		.0820		
93,000		.0834		
94,000		.0856		
95,000		.0876		
96,000		.55		
99,200	31,000	.80		
112,000	35,000	1.80		
128,000	40,000	3.50		Elongation of 10″ sections: ″.80, ″.81, ″.81, ″.81, ″.80, ″.80, ″.79, ″.77.
144,000	45,000	6.33		
159,400				Rested 3 minutes.
0	0			Ultimate strength at time of fracture.
159,800	49,937			
143,000				=22.6 per cent.
0	0	18.05		

Elongation of 10″ sections: 2″.31, 2″.59 (3″.60 at fracture), 2″.31, 2″.02, 1″.83, 1″.71, 1″.65.
Diameter at fracture, 1″.50; area, 177 square inches.
Contraction of area, 45 per cent.
Fracture fibrous, cup-shaped.

No. 604.

Mark on bar, L 210.
Diameter, 2″.02; sectional area, 3.20 square inches.
Gauged length, 80″.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,200	1,000	0.		
16,000	5,000	.0120		
32,000	10,000	.0265		
	1,000		—.0004	
48,000	15,000	.0410		

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Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
64,000	20,000	.0552	.....	
.....	1,000	.....	—.0020	
66,000	.....	.0570	.....	
68,000	.....	.0590	.....	
70,000	.....	.0610	.....	
72,000	.....	.0630	.....	
74,000	.....	.0650	.....	
76,000	.....	.0668	.....	
78,000	.....	.0690	.....	
80,000	25,000	.0710	.....	
.....	1,000	.....	—.0010	
81,000	.....	.0723	.....	
82,000	.....	.0735	.....	
83,000	.....	.0748	.....	
84,000	.....	.0763	.....	
85,000	.....	.0776	.....	
86,000	.....	.0790	.....	
87,000	.....	.0803	.....	
88,000	.....	.0819	.....	
89,000	.....	.0835	.....	
90,000	.....	.0854	.....	
91,000	.....	.0870	.....	
92,000	.....	.0896	.....	
93,000	.....	.0920	.....	
94,000	.....	.0945	.....	
95,000	.....	.0960	.....	
96,000	.....	.765	.....	
99,200	31,000	.86	.....	
112,000	35,000	1.70	.....	
128,000	40,000	3.35	.....	Elongation of 10″ sections: ″.78, ″.76, ″.76, ″.76, ″.75, ″.75, ″.77, ″.79.
144,000	45,000	6.07	.....	
160,400	.....	.....	.....	
0	0	.....	.....	
160,600	50,188	.....	.....	Ultimate strength.
0	0	15.96	.....	=19.9 per cent.

Elongation of 10″ sections: 1″.81, 1″.93, 1″.96, 1″.87, 1″.87, 1″.91, 2″.04, 2″.50.

Diameter at fracture, 1″.52; area, 1.82 square inches.

Contraction of area, 43 per cent.

Fracture fibrous, cup-shaped; broke 2″ outside of gauged section and 10″ from face of holder jaws.

Tensile tests of single and double refined wrought iron (round bars).

[Tabulated results.]

Number of test.	Mark on bar.	Kind of iron.	Diameter of specimen.	Sectional area	Elastic limit.	Ultimate strength.	Elongation in 80 inches.	Contraction of area.	Appearance of fracture.
			Inch.	*Sq. in.*	*Lbs. per sq. in.*	*Lbs. per sq. in.*	*Per cent.*	*Per cent.*	
593	S 18...	Single refined	2.01	3.17	24,600	49,680	19.5	32	Fibrous; slightly granular.
594	S 19...	....do	2.01	3.17	25,870	49,338	18.3	38	Fibrous.
595	S 20...	....do	2.01	3.17	24,920	48,864	18.4	37	Fibrous, with some cinder at center.
596	S 218 ..	Double refined	2.01	3.17	24,610	50,631	20.4	41	Fibrous.
597	S 219...	.....do	2.01	3.17	.....	50,915	25.5	44	Fibrous; cup-shaped.
598	S 220...	.....do	2.01	3.17	.....	50,205	23.7	44	Do.
599	L 8 ...	Single refined	2.03	3.24	.....	51,667	22	36	Fibrous, 70 per cent.; granular, 30 per cent.
600	L 9 ...	....do	2.02	3.20	.....	50,844	16.3	22	Fibrous, 15 per cent.; granular, 85 per cent.
601	L 10 ..	....do	2.02	3.20	.....	53,062	21	40	Fibrous, 95 per cent.; granular, 5 per cent.
602	L 208..	Double refined	2.02	3.20	.....	50,156	22.7	43	Fibrous; cup-shaped.
603	L 209...	.... do	2.02	3.20	.....	49,937	22.6	45	Do.
604	L 210 ..	....do	2.02	3.20	.....	50,188	19.9	43	Do.

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No. 362.

WROUGHT IRON, SINGLE ROLLED BAR.

Supplementary test of No. 973.

Mark on bar, L 5.

Bar tested a second time after about eight months' rest.

Original sectional area of bar, $5''.05 \times 1.''28 = 6.46$ square inches.

Rapid stretching began at 365,000 pounds = 56,500 pounds per square inch. Ultimate strength, 381,000 pounds = 58,980 pounds per square inch on original section.

Area of fracture, $4''.70 \times 1''.14 = 5.36$ square inches.

Contraction of area (from original size), 17 per cent.

Fracture: Granular, 70 per cent.; fibrous, 30 per cent.

10″ sections after second fracture, elongations of B: 2″.10, 1″.85, 1″.80, 1″.80, 1″.86, 1″.82 A.

Second fracture occurred 16″ from the first fracture.

Bar heated slightly hotter than cherry-red, and allowed to cool in the open air. About 12″ to 15″ of the ends were not heated.

Average sectional area of bar, $4''.75 \times 1''.17 = 5.56$ square inches.

Ganged length, 50″.

Loads applied.	Pounds per square inch on reduced section.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
5,560	1,000	0.		
27,800	5,000	.0080		
55,600	10,000	.0188		
	1,000		.0008	
83,400	15,000	.0292		
111,200	20,000	.0401		
	1,000		.0030	
115,000		.0421		
120,000		.0448		
125,000		.0470		
130,000		.0498		
135,000		.0525		
140,000	26,080	.0560		Elastic limit.
145,000		.0780		
150,000		.1770		
234,000	42,090			Ultimate strength.
	21,670			Elastic limit on original section.
	36,220			Ultimate strength on original section.

Broke 17½″ from end A. Fracture, fibrous, 100 per cent.

This fracture took place near the end of the annealed section of the bar.

Stretch of bar about 33 per cent. from original length.

Bar tested again, breaking with 269,000 pounds = 48,380 pounds per square inch = 41,640 pounds per square inch on original section. Fracture, fibrous, 100 per cent.

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Supplementary tests of single and double rolled wrought-iron bars.

No. 384.

Mark on bar, L 2.

Bar retested after ten months' rest.

Present sectional area (average section), 2″.84 × ″.94 = 2.67 square inches.

Gauged length, 50″.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,670	1,000	0.		
13,350	5,000	.0178		
26,700	10,000	.0175		
	5,000		.0005	
40,050	16,000	.0275		
53,400	20,000	.0365		
	1,000		.0008	
66,750	25,000	.0460		
80,100	30,000	.0558		
	1,000		.0010	
85,000		.0590		
90,000		.0628		
95,000		.0660		
100,000		.0695		
106,800	40,000	.0742		
	1,000		.0011	
110,000		.0768		
115,000		.0800		
116,000		.0808		
117,000		.0816		
118,000		.0825		
119,000		.0830		
120,000		.0838		
121,000		.0846		
122,000		.0852		
123,000		.0858		
124,000		.0866		
125,000		.0875		
126,000		.0880		
127,000		.0888		
128,000		.0895		
129,000		.0905		
130,000		.0910		
131,000		.0918		
132,000		.0922		
133,000		.0930		
134,000		.0938		
135,000		.0946		
136,000		.0955		
137,000		.0960		
138,000		.0968		
139,000		.0975		
140,000		.0984		
141,000		.0990		
142,000		.1000		
143,000		.1008		
144,000		.1015		
145,000		.1022		
146,000		.1030		
147,000		.1038		
148,000		.1048		
149,000		.1055		
150,000		.1062		
151,000		.1072		
152,000		.1080		
153,000		.1090		
154,000		.1100		
155,000		.1108		
156,000		.1118		
157,000		.1128		
158,000		.1138		
159,000		.1148		
160,000		.1158		
161,000		.1168		
162,000		.1178		
163,000		.1188		
164,000		.1200		

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Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
165,000	61,800	.1210	.....	Elastic limit on original area, 53,920 pounds per square inch.
166,000	.....	.1225	.....	
167,000	.....	.1238	.....	
168,000	.....	.1250	.....	
169,000	.....	.1262	.....	
170,000	.....	.1278	.....	
171,000	.....	.1290	.....	
172,000	.....	.1308	.....	
173,000	.....	.1322	.....	
174,000	.....	.1340	.....	
175,000	.....	.1358	.....	
176,000	.....	.1378	.....	
177,000	.....	.1400	.....	
178,000	.....	.1428	.....	
179,000	.....	.1455	.....	
180,000	.....	.1490	.....	Ultimate strength on original area 63,130 pounds per square inch.
193,200	72,360	.....	.....	
0	0	3.40	.....	= 6.8 per cent.

Elongation of 10″ sections from original lengths: 2″.41, 2″.72, 2″.70, 2″.47, 2″.30, 2″.20, 2″.01.

Area at fracture, 2″.72 × ″.88 = 2.39 square inches.
Contraction of area from original section, 21.9 per cent.
Granular fracture.

No. 385.

The longer fractured end of bar No. 384 was now taken and heated over an open fire till dull red in daylight, and then cooled in open air.
Present sectional area, 2″.80 × ″.92 = 2.58 square inches.
Gauged length, 20″.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,580	1,000	0.	.....	
12,900	5,000	.0028	.....	
25,800	10,000	.0062	.....	
38,700	15,000	.0100	.....	
51,600	20,000	.0140	.....	
.....	1,000	.....	.0008	
55,000	.....	.0150	.....	
58,000	.....	.0160	.....	
61,000	.....	.0170	.....	
64,000	.....	.0185	.....	
67,000	.....	.0191	.....	
70,000	27,130	.0200	.....	Elastic limit, 22,880 pounds per square inch on original section.
73,000	.....	.0221	.....	
76,000	.....	.0358	.....	
79,000	.....	{.0595 / .0688}	.....	After sustaining load 3 minutes.
82,000	.....	.0750	.....	
85,000	.....	.147	.....	
126,200	48,910	.....	.....	Ultimate strength, 41,240 pounds per square inch on original section.
0	0	1.52	.....	= 7.6 per cent.

Elongation of original 10″ sections: 3″.60, 3″.08, 2″.91.

Area at fracture, 2″.52 × ″.80 = 2.02 square inches.
Contraction of area (from original section), 34 per cent.
Fracture, dull fibrous.

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No. 386.

Supplementary test of bar L 201.

Rested since original test ten months.
Present sectional area (average, 2″.87 × ″.95 = 2″.73 square inches.
Gauged length, 50″.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,730	1,000	0.		
13,650	5,000	.0080		
27,300	10,000	.0180		
54,600	20,000	.0370		
81,900	30,000	.0560		
109,200	40,000	.0748		
	1,000		.0006	
122,850	45,000	.0840		
136,500	50,000	.0940		
	1,000		.0011	
138,000		.0955		
140,000		.0968		
142,000		.0982		
144,000		.0999		
146,000		.1013		
148,000		.1030		
150,000		.1046		
151,000		.1058		
152,000		.1064		
153,000		.1072		
154,000		.1081		
155,000		.1090		
156,000		.1100		
157,000		.1110		
158,000		.1120		
159,000		.1128		
160,000		.1138		
161,000		.1150		
162,000		.1160		
163,000		.1170		
164,000		.1180		
165,000	60,440	.1192		Elastic limit, 53,920 pounds per square inch on original section.
166,000		.1206		
167,000		.1218		
168,000		.1230		
169,000		.1245		
170,000		.1258		
171,000		.1272		
172,000		.1288		
173,000		.1305		
174,000		.1320		
175,000		.1340		
176,000		.1360		
178,000		.1408		
180,000		.1480		
182,000		.155		
184,000		.535		
193,000	70,696			Ultimate strength, 63,070 pounds per square inch on original area.
0	0	2.13		= 4.3 per cent.

Elongation of 10″ sections from original lengths: 8″.28 ☼, 1″.99, 1″.93, 1″.98, 1″.95, 2″.

Area at fracture, 2″.76 × ″.89 = 2.46 square inches.

Contraction of area (from original area), 19.6 per cent.

Fracture: Granular, 90 per cent.; with fibrous spot, 10 per cent.

The longer fractured end of bar No. 386 was now taken and heated over an open fire till it would melt solder rubbed on its surface; temperature called 370°, allowed to cool in the open air.

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No. 387.

L 201, continued.
Present sectional area, 2″.83 × ″.92 = 2.6 square inches.
Gauged length, 20″.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,600	1,000	0.		
13,000	5,000	.0030		
26,000	10,000	.0068		
2,600	1,000	0.		
13,000	5,000	.0030		
26,000	10,000	.0068		
39,000	15,000	.0108		
52,000	20,000	.0145		
	1,000		0.	
55,000		.0155		
58,000		.0162		
61,000		.0171		
64,000		.0180		
67,000		.0190		
70,000		.0200		
73,000		.0208		
76,000		.0215		
79,000		.0225		
82,000		.0235		
85,000		.0241		
88,000		.0250		
91,000		.0260		
94,000		.0270		
97,000		.0280		
100,000		.0288		
103,000		.0295		
106,000		.0305		
109,000		.0312		
112,000		.0320		
115,000		.0330		
118,000		.0339		
121,000		.0348		
124,000		.0356		
127,000		.0365		
130,000		.0370		
133,000		.0380		
136,000		.0388		
139,000		.0398		
142,000		.0408		
145,000		.0415		
148,000		.0422		
151,000		.0432		
154,000		.0442		
157,000		.0452		
160,000		.0462		
163,000		.0470		
166,000		.0480		
169,000		.0490		
176,000	67,700			Ultimate strength, 57,520 pounds per square inch on original section.
0	0	0		

Area at fracture, 2″.56 × ″.78 = 2 square inches.
Contraction of area (from original section), 34.6 per cent.
Fracture fibrous, 60 per cent.; interspersed with granular spots, 40 per cent.
Broke outside 20″, gauged length.
During this test the bar stretched in the vicinity of the fracture and slightly at the opposite end, about ″.07 in ″.10.
Tested again March 1, 1882.
Ultimate strength, 191,000 pounds = 62,420 pounds per square inch on original section.
Fracture: Fibrous, 60 per cent.; granular, 40 per cent.

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Supplementary test of bar L 203.

Rested nine months since original test.
Present sectional area, 2″.84 × ″.94 = 2″.67 square inches.
Gauged length, .50″.

No. 388.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,670	1,000	0.		
13,350	5,000	.0075		
26,700	10,000	.0170		
53,400	20,000	.0355		
80,100	30,000	.0540		
106,800	40,000	.0725		
133,500	50,000	.0910		
	1,000		.0006	
140,000		.0960		
150,000		.1032		
152,000		.1050		
154,000		.1068		
156,000		.1085		
158,000		.1102		
160,000		.1120		
161,000		.1128		
162,000		.1138		
163,000		.1148		
164,000		.1159		
165,000		.1170		
166,000		.1180		
167,000		.1190		
168,000		.1200		
169,000		.1210		
170,000		.1220		
171,000	64,040	.1232		Elastic limit, 55,880 pounds per square inch on original section.
172,000		.1248		
173,000		.1262		
174,000		.1278		
175,000		.1288		
176,000		.1300		
177,000		.1320		
178,000		.1338		
179,000		.1352		
180,000		.1375		
181,000		.1395		
182,000		.1420		
183,000		.1446		
184,000		.1478		
185,000		.1512		
186,000		.1582		
187,000		.1660		
193,900	72,620			Ultimate strength, 63,360 pounds per square inch on original section. a
0	0	2.10		= 4.2 per cent.

Elongation of original 10″ sections: 2″.12, 2″.30 , 2″.11, 2″.06, 1″.98, 2″.06.
Area at fracture, 2″.75 × ″.89 = 2.45 square inches.
Contraction of area from original section, 19.9 per cent.
Fracture: Granular, 70 per cent.; fibrous, 30 per cent.

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Tabulation of tensile tests of wrought-iron bars, showing original strength and strength after the bars had rested, also strength after annealing.

Number of test.	Condition of bar when tested.	Size of bar when tested.			Strains on original section.		Strains on reduced section.		Uniform elongation from original length.	Contraction of area from original section.	Appearance of fracture	Remarks.
		Width.	Thick.	Sectional area.	Elastic limit.	Ultimate strength.	Elastic limit.	Ultimate strength.				
		Inch.	*Inch.*	*Sq. in.*	*Lbs. per sq. in.*	*Lbs. per sq. in.*	*Lbs. per sq. in.*	*Lbs. per sq. in.*	*Pr. ct.*	*Pr. ct.*		
993	Original	3.05	1	3.05	29,500	51,150	.....	.....	21	31.5	Fine fibrous	
	Rested four months since original test.	.....	.....	.....	.....	60,000	.....	.....	24	.....	Fibrous, 90 per cent.; granular 10 per cent.	
994	Original	3.05	1	3.05	28,500	51,110	.....	.....	21	36.1	Fine fibrous	
	Rested four and two-thirds months	.....	.....	.....	53,440	61,960	.....	.....	25	33.8	Fibrous, 92 per cent.; granular, 8 per cent.	
981	Original	3.05	1.01	3.08	28,000	50,390	.....	.....	14	35.1	Fibrous	
	Rested five months	.....	.....	.....	.....	60,390	.....	.....	20	21.8	Granular, 70 per cent.; fibrous, 30 per cent.	
973	Original	5.05	1.28	6.46	27,500	50,500	.....	.....	13	24.2	Fibrous, 95 per cent.; granular, 5 per cent.	
	Rested eight months	.....	.....	.....	56,500	58,980	.....	.....	18	17	Fibrous, 30 per cent.; granular, 70 per cent.	
	Heated cherry-red and cooled in open air.	4.75	1.17	5.56	21,670	{36,220 / 41,640}	26,080	{42,090 / 48,380}	33	.....	Fibrous	Broke at end of annealed section.
774	Original	3.03	1.01	3.06	29,500	53,630	.....	.....	16	36	Fibrous, 92 per cent.; granular, 8 per cent	
384	Rested ten months	2.84	.94	2.67	53,920	63,130	61,800	72,360	23	21.9	Granular	
385	Heated dull red and cooled in open air.	2.80	.92	2.58	22,800	41,240	27,130	48,910	32	34	Dull fibrous	
777	Original	3.03	1.01	3.06	29,000	53,560	.....	.....	15	37.9	Fibrous	
386	Rested ten months	2.87	.95	2.73	53,920	63,070	60,440	70,696	19	19.6	Fibrous, 10 per cent.; granular, 90 per cent	
387	Heated to 370° and cooled in open air.	2.83	.92	.....	57,520	57,520	67,700	67,700	19	34.6	Fibrous, 60 per cent.; granular, 40 per cent	
	Rested fifteen days after third test	.....	.....	.....	.....	62,420	.....	.....	.....	.....	....do	
971	Original	3.03	1.01	3.06	32,500	53,500	.....	.....	16	27.5	Fibrous	
388	Rested nine months	2.84	.94	2.67	55,880	63,360	64,040	72,620	21	19.9	Fibrous, 30 per cent.; granular, 70 per cent.	
389	Rested nine months	2.84	.92	2.61	.....	66,010	.....	77,400	21	19.9	Fine granular	

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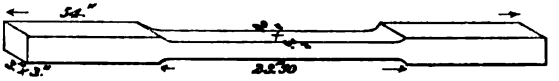
Tensile test of wrought iron for 3″ × 3″ compression tests.

No. 321.

FORM OF SPECIMEN.



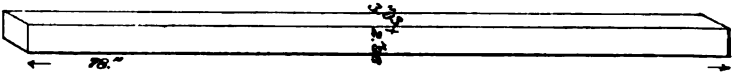
Gauged length, 20″.
Sectional area, 6 square inches.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
6,000	1,000	0.		
30,000	5,000	.0030		
60,000	10,000	.0070		
	1,000		0.	
90,000	15,000	.0108		
108,000	18,000	.0130		
120,000	20,000	.0150		
	1,000		.0009	
123,000		.0160		
130,000		.0170		
132,000		.0176		
134,000		.0181		
136,000		.0185		
138,000		.0189		
140,000		.0192		
142,000		.0199		
144,000		.0205		
146 000	24,330	.0210		Elastic limit.
148,000		.0219		
150,000	25,000	.0228		
	1,000		.0050	
152,000		.0260		
154,000		.0280		
156,000		.0420		Still elongates under this load.
308,400	51,600			Ultimate strength.
0	0	4.31		= 21.5 per cent.

Elongation of 1″ sections: ″.22, ″.21, ″.20, ″.23, ″.26, ″.36, ″.46 ✠, ″.28, ″.22, ″.19, ″.18, ″.18, ″.18, ″.17, ″.18, ″.17, ″.17, ″.17, ″.17, 17″, ″.17.
Area at fracture, 2″.47 × 1″.67 = 4.12 square inches.
Contraction of area, 31.3 per cent.
Appearance of fracture: Fibrous, 60 per cent.; granular, 40 per cent.
Light-colored fracture.

No. 322.

Tensile test of wrought iron for 3″ × 3″ compression tests.



Sectional area, 8.97 square inches.
Gauged length, 20″.

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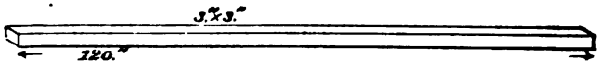
Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
8, 970	1, 000	0.		
44, 850	5, 000	.0030		
89, 700	10, 000	.0071		
	1, 000		.0002	
134, 550	15, 000	.0121		
161, 460	18, 000	.0155		
179, 400	20, 000	.0178		
	1, 000		.0032	
180, 000		.0182		Rested 10 minutes.
182, 000		.0188		
184, 000		.0188		
186, 000		.0190		
188, 000		.0191		
190, 000		.0192		
192, 000		.0195		
194, 000		.0198		
196, 000		.0200		
198, 000		.0205		
200, 000		.0208		
202, 000		.0212		
204, 000		.0219		
206, 000		.0222		
208, 000		.0226		
210, 000		.0228		
212, 000		.0231		
214, 000		.0235		
216, 000		.0240		
218, 000		.0248		
220, 000		.0251		
222, 000		.0259		
224, 250	25, 000	.0268		
	1, 000		.0036	
226, 000		.0280		
228, 000		.0290		
230, 000	25, 640	.0300		Elastic limit.
232, 000		.0325		
234, 000		.0490		
236, 000		.0860		
452, 500	50, 446			Ultimate strength.
0	0	4. 30		= 21.5 per cent.

Elongation of 1″ sections: ″.20, ″.20, ″.21, ″.22, ″.22, ″.22, ″.22, ″.22, ″.21, ″.22, ″.22, ″.22, ″.22, ″.23, ″.23, ″.24, ″.24, ″.23, ″.23, ″.24.
Area at fracture, 2″.56 × 2″.50 = 6.4 square inches.
Contraction of area, 28.6 per cent.
Broke 4″ from face of holder jaws.
Appearance: Fibrous, 40 per cent.; granular, 60 per cent.

No. 323.

Tensile test of wrought iron for 3″ × 3″ compression tests.



Sectional area, 9 square inches.
Gauged length, 50″.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
9, 000	1, 000	0.		
45, 000	5, 000	.0078		
90, 000	10, 000	.0172		
	1, 000		.0002	
135, 000	15, 000	.0270		
162, 000	18, 000	.0335		
180, 000	20, 000	.0400		

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Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
	1,000		.0002	
185,000		.0459		
190,000		.0505		
192,000		.0540		
194,000		.0555		
196,000		.0570		
198,000		.0598		
200,000		.0650		
202,000		.0712		
204,000		.0870		
206,000		.123		
	1,000			Rested one hour.
446,000				Ultimate strength.
0	0	11.36		= 22.7 per cent.

Elongation of 5″ sections: 1″.11, 1″.20, 1″.30, 1″.20, 1″.19, 1″.21, 1″.11, 1″.04, 1″.02, 1″.02.

Area at fracture, 2″.45 × 2″.45 = 6 square inches.

Contraction of area, 33.3 per cent.

Broke at face of holder jaws.

Appearance: Fibrous, 45 per cent.; granular, 55 per cent.

No. 390.

Tensile test of 3″ × 3″ wrought iron, bar branded.

STIRLING BEST—BEST REFINED.

Total length of bar, about 78″.

Gauged length, 24″.

Sectional area, 3″.02 × 3″.02 = 9.12 square inches.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
9,120	1,000	0.		
45,600	5,000	.0030		
91,200	10,000	.0075		
	1,000		0.	
136,800	15,000	.0120		
182,400	20,000	.0161		
	1,000		.0005	
188,000		.0170		
193,000		.0178		
198,000		.0182		
203,000		.0190		
208,000		.0195		
213,000		.0200		
218,000		.0210		
223,000		.0215		
228,000	25,000	.0225		
	1,000		.0020	
230,000		.0231		
232,000		.0238		
234,000		.0241		
236,000		.0245		
238,000		.0251		
240,000		.0260		
242,000		.0262		
244,000		.0266		
246,000	26,970	.0270		Elastic limit.
248,000		.0278		
250,000		.0286		
252,000		.0440		
254,000		.1100		
260,000		.136		
270,000		.192		
449,000	49,230			Ultimate strength.
0	0	3.15		=13.1 per cent.

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Elongation of inch sections after fracture of bar: ".15, ".14, ".14, ".14, ".13, ".13, ".13, ".13, ".13, ".13, ".14, ".15, ".13, ".13, ".13, ".13, ".12, ".13, ".13, ".13, ".13, ".13, ".14, ".13.

Fractured about 1 inch inside the section covered by holder jaws.

Area at fracture, $2''.83 \times 2''.78 = 7.87$ square inch.

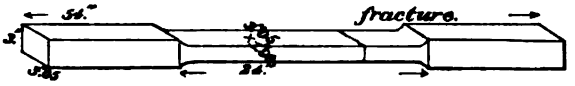
Contraction of area, 13.7 per cent.

Appearance of fracture: Granular, 95 per cent.; fibrous, 5 per cent.

No. 395.

Tensile test of 3" × 3" wrought-iron bar.

FORM OF SPECIMEN.



Sectional area, $3''.05 \times 1''.99 = 6.07$ square inches.

Gauged length, 24".

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
6,070	1,000	0.		
30,350	5,000	.0031		
60,700	10,000	.0078		
	1,000		.0002	
91,050	15,000	.0128		
121,400	20,000	.0185		
	1,000		.0020	
124,000		.0192		
127,000		.0200		
130,000		.0210		
133,000		.0220		
136,000		.0230		
139,000	22,900	.0240		Elastic limit.
142,000		.0258		
145,000		.0282		
148,000		.0310		
151,750	25,000	.0400		
	1,000		.0200	
154,000		.0490		
157,000		.0560		
160,000		.0720		
163,000		.098		
296,000	48,764			Ultimate strength.
0	0	4.85		= 20.2 per cent.

Elongation of 1" sections after fracture: ".16, ".20, ".22, ".21, ".29✱, ".21, ".23, ".21, ".20, ".20, ".20, ".20, ".22, ".22, ".26, ".23, ".23, ".22, ".20, ".21, ".20, ".18, ".18, ".15.

Area of fracture, $2''.78 \times 1''.83 = 5.09$ square inches.

Contraction of area, 16.1 per cent.

Broke 6" from neck, with granular fracture varying in degree of coarseness, fibrous about 5 per cent.

Seams in iron.

No. 396.

Off same bar as No. 395.

Tested full size as it came from the rolls.

Total length, 126".75.

Gauged length, 80".

Sectional area, $3''.03 \times 3''.02 = 9.15$ square inches.

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Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
9,150	1,000	0.		
45,750	5,000	.0120		
91,500	10,000	.0275		
	1,000		.0005	
137,250	15,000	.0430		
183,000	20,000	.0620		
	1,000		.0050	
188,000		.0650		
193,000		.0685		
198,000		.0710		
203,000		.0740		
208,000	22,730	.0780		Elastic limit.
213,000		.0830		
218,000		.0908		
223,000		.1065		
228,750	25,000	.1580		
	1,000		.0858	
233,000		.2060		
238,000		.347		
408,500	44,645			Ultimate strength.
0	0	7.62		=9.5 per cent.

Elongation in 5″ sections after fracture of bar: ″.50, ″.50, ″.47 ″.55, ″.48, ″.51, ″.49, ″.46, ″.46, 47, ″.46, ″.48, ″.47, ″.46, ″.48, ″.4.

No. 396.

Area at fracture, 2″.87 × 2″.87 = 8.24 square inches.

Contraction of area, 10 per cent.

Broke 42″.50 from end. Appearance granular. Similar to fracture of end No. 395.

Eight cracks along one surface developed by test. Maximum crack, 3″ long × ½″ deep.

Small piece, about 1 ounce weight, flew out at point of fracture when specimen broke.

WROUGHT IRON—ROUND BARS.

Tests to determine the modulus of elasticity in the same bars for strains of tension and compression.

Bars of Phoenix and Pencoyd iron, cut in two at middle; one end strained by tension, and one end by compression.

These bars were taken from the same lot of iron that was used for the transverse strength of pins. (See report of tests, 1881.

No. 333.

PHŒNIX IRON—ROUGH BAR.

2½″ diameter, turned down to about 2″ diameter.

Actual diameter, 2.″003.

Sectional area, 3.142 square inches.

Gauged length, 30″.

TENSILE LOADS.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,142	1,000	0.		
15,710	5,000	.0040		
25,136	8,000	.0070		
31,420	10,000	.0090		
	1,000		0	
37,704	12,000	.0114		
47,130	15,000	.0140		E = 30,000,000.
	1,000		0	

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COMPRESSION LOADS.

Pounds per square inch.	Compression.	Permanent set.	Remarks.
	Inch.	*Inch.*	
1,000	0.	.....	
5,000	.0050	.....	
8,000	.0076	.....	
10,000	.0096	.....	
1,000	.....	.0005	
12,000	.0116	.....	
15,000	.0150	.....	
1,000	.....	.0010	

In reversing the load from 1,000 pounds per square inch tension to 1,000 pounds per square inch compression, the gauge showed a movement of ".0020.

NOTE.—Deducting the permanent set ".001 from the compression at 15,000 pounds per square inch, and we find a modulus of elacticity the same as for tension.

TENSION LOADS.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch*	
3,142	1,000	0.	.....	
15,710	5,000	.0040	.....	
25,136	8,000	.0075	.....	
31,420	10,000	.0095	.....	
.....	1,000	.....	.0005	
37,704	12,000	.0115	.....	
47,130	15,000	.0148	.....	
.....	1,000	.....	.0004	

COMPRESSION LOADS.

Pounds per square inch.	Compression.	Permanent set.	Remarks.
	Inch.	*Inch.*	
1,000	0.	.....	
5,000	.0044	.....	
8,000	.0076	.....	
10,000	.0096	.....	
1,000	.....	.0004	
12,000	.0116	.....	
15,000	.0149	.....	
1,000	.....	.0004	

The gaugings in last test were taken with the "friction dial" measuring instrument. To verify these measurements the screw micrometer is now placed on the specimen.

TENSION LOADS.

Pounds per square inch.	Elongation.	Permanent set.	Remarks.
	Inch.	*Inch.*	
1,000	0.	.....	Test resumed after bar had rested under zero load sixty-two hours.
5,000	.0045	.....	
8,000	.0078	.....	
10,000	.0099	.....	
1,000	.....	.0009	
12,000	.0122	.....	
15,000	.0154	.....	
1,000	.....	.0010	

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COMPRESSION LOADS.

Pounds per square inch.	Compression.	Permanent set.	Remarks.
	Inch.	*Inch.*	
1,000	0.	.....	
5,000	.0040	.....	
8,000	.0070	.....	
10,000	.0092	.....	
1,000	.....	.0001	
12,000	.0121	.....	
15,000	.0142	.....	
1,000	.....	.0001	

No. 334.

PHŒNIX IRON.

Off same bar as No. 333.
2¼″ rough bar turned down to 2″.003.
Sectional area, 3.142 square inches.
Gauged length, 30″.

COMPRESSION LOADS.

Pounds per square inch.	Compression.	Permanent set.	Remarks.
	Inch.	*Inch.*	
1,000	0.	.....	
5,000	.0040	.....	
8,000	.0068	.....	
10,000	.0088	.....	
1,000	.....	—.0002	
12,000	.0108	.....	
15,000	.0139	.....	E=29,800,000.
1,000	.....	—.0002	

TENSION LOADS.

Pounds per square inch.	Elongation.	Permanent set.	Remarks.
	Inch.	*Inch.*	
1,000	0.	.....	
5,000	.0044	.....	
8,000	.0075	.....	
10,000	.0095	.....	
1,000	.....	.0007	
12,000	.0117	.....	
15,000	.0147	.....	E=29,580,000.
1,000	.....	.0005	

COMPRESSION LOADS.

Pounds per square inch.	Compression.	Permanent set.	Remarks.
	Inch.	*Inch.*	
1,000	0.	.....	
5,000	.0042	.....	
8,000	.0072	.....	
10,000	.0095	.....	
1,000	.....	.0005	
12,000	.0115	.....	
15,000	.0148	.....	
1,000	.....	.0005	

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TENSION LOADS.

Pounds per square inch.	Elongation.	Permanent set.	Remarks.
	Inch.	*Inch.*	
1,000	0.		
5,000	.0040		
8,000	.0074		
10,000	.0095		
1,000		.0005	
12,000	.0115		
15,000	.0147		
1,000		.0005	

No. 335.

PENCOYD IRON.

2¼″ rough bar turned down to 1″.995 diameter.
Sectional area, 3.126 square inches.
Gauged length, 30″.

TENSION LOADS.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,126	1,000	0.		
15,630	5,000	.0044		
25,008	8,000	.0074		
31,260	10,000	.0094		
	1,000		.0004	
37,512	12,000	.0115		
46,890	15,000	.0144	—.0001	
	1,000			
	15,000	.0144		
	1,000		—.0002	
	15,000	.0144		
	1,000		0.	
	10,000	.0095		
	1,000		0.	
56,268	18,000	.0168		
62,520	20,000	.0185		
	1,000		—.0012	
	5,000	.0037		
	8,000	.0070		
	10,000	.0092		
	1,000		0.	
	1,000		0. +	After resting 5 minutes.
	1,000		—.0001	After resting 15 minutes.
	10,000	.0093		
	15,000	.0148		
	20,000	.0203		
	1,000		.0003	
68,770	22,000	.0210		
71,898	23,000	.0220		
75,024	24,000	.0231		
76,587	24,500	.0235		
78,150	25,000			Sustained momentarily.
	1,000		—.0014	Springing the micrometer will vary the reading permanently about ″.0003. In use this springing would not occur. The springing was done experimentally. Load sustained momentarily.
	25,000	.0240		
79,713	25,500	.0244		
81,276	26,000	.0249		
82,839	26,500	.0255		
84,402	27,000	.0262		
85,965	27,500	.0271		
87,528	28,000			
	1,000		—.0006	

REMARKS.—It has been observed in the test of some flat rolled bars that permanent sets caused by loads of 10,000 pounds per square inch, or about that, were eliminated by higher strains, and, also, there has in a few cases appeared a permanent shortening

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after the bar had been elongated. The apparent shortening was attributed to straightening of the bars in previous tests where this behavior occurred.

In the present instance, with a carefully turned bar, such an explanation as the above is obviously inadmissible. It would now appear that the above bar had initial strains which were released or some molecular arrangement broken up at 15,000 pounds per square inch, which enabled the bar to recover its original length upon the removal of that load, and even contract slightly, giving a minus sign to the permanent set.

This behavior is more marked after the bar was strained 20,000 pounds per square inch.

The measuring instrument, a micrometer screw, was carefully inspected to see that an instrumental error was not the cause of the minus permanent sets, but the instrument was found in good condition.

In corroboration of the micrometer measuring instrument, the scale beam of the testing-machine gave indication that a shortening of the specimen took place immediately after the strains were reduced to the initial load of 1,000 pounds per square inch.

After six months' rest, bar tested to the ultimate breaking strength = 163,800 pounds = 52,400 pounds per square inch.

Diameter of fracture, 1″.54 = 1.86 square inches; contraction of area, 40.5 per cent.; appearance fibrous, with slight granulation.

No. 336.

PENCOYD IRON.

Off same bar as No. 335.
Diameter, 2″.000.
Sectional area, 3.142 square inches.
Gauged length, 30″.
Friction dial used for measurement.

TENSION LOADS.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,142	1,000	0.	.....	
15,710	5,000	.0042	.....	
25,136	8,000	.0075	.....	
31,420	10,000	.0098	.....	
.....	1,000	.....	.0001	
37,704	12,000	.0120	.....	
47,130	15,000	.0150	.....	
.....	1,000	.....	0.	
56,556	18,000	.0179	.....	
62,840	20,000	.0194	.....	
.....	1,000	.....	−.0008	
72,266	23,000	.0223	.....	
.....	1,000	.....	−.0010	
78,550	25,000	.0243	.....	
.....	1,000	.....	−.0012	

In the test of No. 336 another measuring instrument was used—the friction dial instrument.

This bar, which was cut off the end of No. 335, showed a similar behavior to it, and as the dial-measuring instrument and the scale beam again in this case pointed to the same result, it is believed that a permanent shortening of the specimens did actually take place after loads between 15,000 pounds per square inch and 25,000 pounds per square inch had been applied and released.

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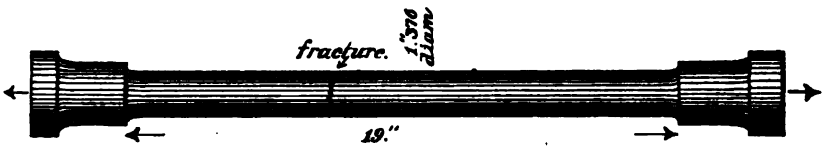
No. 354.

CAST IRON.

Tensile test of cast (gun) iron from South Boston Iron Company.

Mark on specimen: "No. 5, Block B."

FORM OF TEST PIECE.



Sectional area, 1.5 square inches.
Gauged length, 15".

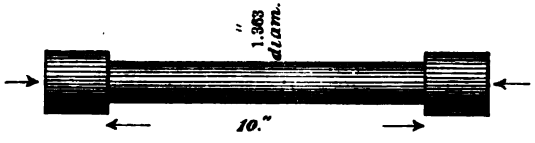
Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
1,500	1,000	.0003	0.	
3,000	2,000	.0005	0.	
4,500	3,000	.0014	0.	
6,000	4,000	.0020	0.	
7,500	5,000	.0030	0.	
9,000	6,000	.0040	0.	
10,500	7,000	.0050	.0003	
12,000	8,000	.0060	.0005	
13,500	9,000	.0070	.0005	
15,000	10,000	.0083	.0005	
16,500	11,000	.0094	.0006	
18,000	12,000	.0105	.0007	
19,500	13,000	.0120	.0013	
21,000	14,000	.0133	.0015	
22,500	15,000	.0147	.0019	
24,000	16,000	.0164	.0025	
25,500	17,000	.0180	.0030	
27,000	18,000	.0204	.0036	
28,500	19,000	.0224	.0045	
30,000	20,000	.0250	.0059	
31,500	21,000	.0285	.0080	
33,000	22,000	.0325	.0105	
34,500	23,000	.0380	.0145	
36,000	24,000	.0446	.0195	
37,500	25,000	.....	.....	Ultimate strength.

Broke 1¾" from middle of bar.

No. 355.

Compression test of cast (gun) iron from South Boston Iron Company.

Mark on specimen: "No. 5, Block. A."



Sectional area, 1.46 square inches.
Gauged length, 10".

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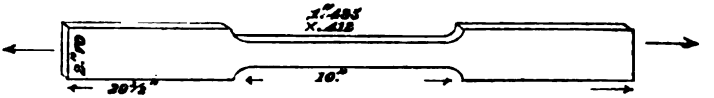
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
1,460	1,000	.0005	0.	
2,920	2,000	.0016	0.	
4,380	3,000	.0018	0.	
5,840	4,000	.0025	.0002	
7,300	5,000	.0030	.0005	
8,760	6,000	.0040	.0005	
10,220	7,000	.0045	.0005	
11,680	8,000	.0050	.0005	
13,140	9,000	.0060	.0006	
14,600	10,000	.0074	.0007	
16,060	11,000	.0075	.0008	
17,520	12,000	.0080	.0010	
18,980	13,000	.0082	.0010	
20,440	14,000	.0090	.0010	
21,900	15,000	.0100	.0010	
23,360	16,000	.0105	.0012	
24,820	17,000	.0105	.0012	
26,280	18,000	.0115	.0010	
27,740	19,000	.0125	.0010	
29,200	20,000	.0130	.0015	
30,660	21,000	.0140	.0014	
32,120	22,000	.0150	.0020	
33,580	23,000	.0158	.0019	
35,040	24,000	.0165	.0030	
36,500	25,000	.0174	.0030	
37,960	26,000	.0185	.0030	
39,420	27,000	.0200	.0032	
40,880	28,000	.0205	.0048	
42,340	29,000	.0225	.0048	
43,800	30,000	.0234	.0054	
45,260	31,000	.0251	.0068	
46,720	32,000	.0270	.0076	
48,180	33,000	.0290	.0092	
49,640	34,000	.0310	.0110	
51,100	35,000	.0332	.0 30	
52,560	36,000	.0359	.0150	
54,020	37,000	.0400	.0180	
55,480	38,000	.0427	.0205	
56,940	39,000	.0475	.0 42	
58,400	40,000	.0516	.0 80	
108,800	74,520	.....	.....	Ultimate strength.

SHAPE AFTER FRACTURE.

No. 382.

Tensile test of gun-metal (bronze) used in cavalry forge cart—details.



Sectional area, .616 square inch.
Gauged length, 10″.

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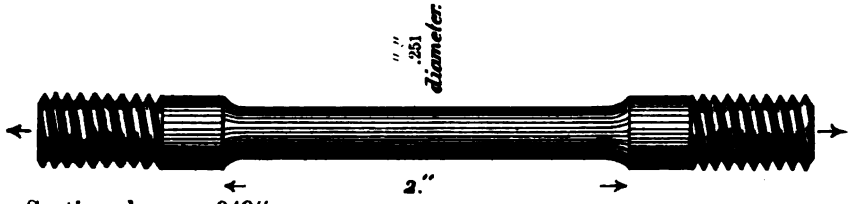
Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
5,000		0.		Elongations measured from load of 5,000 pounds.
6,000		.0013		
7,000		.0028		
8,000		.0042		
9,000		.0061		
9,800	15,910			Elastic limit.
10,000		.0082		
5,000			.0019	
10,500		.0100		
11,000		.0116		
11,500		.0140		
12,000		.0176		
12,500		.0200		
5,000			.0100	
13,000		.0239		
14,000		.0340		
15,000		.0496		
18,900	30,680			Ultimate strength.
0	0	.15		= 1.5 per cent.

Broke, about $\frac{1}{4}''$ from curve of neck.
Fracture, dull color.
Fractured, with slight contraction.

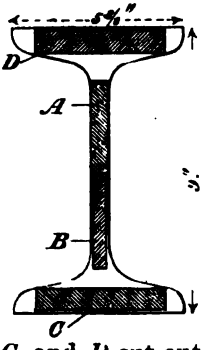
No. 383.

Tensile test of gun-metal cut from nave, cavalry forge cart.



Sectional area, .049".
Ultimate strength, 1,605 pounds= 32,760 pounds per square inch.
Broke about $\frac{1}{16}''$ from middle of specimen.
Elongation about ".29 in 2" $=14\frac{1}{2}$ per cent.
Fracture bright, varying in color.

Test of a 9" wrought-iron I beam by strains of tension and compression.



Tensile specimens *A*, *B*, *C*, and *D* cut out of beam, as shown by the sketch.

Specimen *A* has planed edges and rough sides. Specimens *B*, *C*, and D are planed on all faces. Specimen *E* compression test of the full section of beam.

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No. 337.

Tensile test of Specimen A.

Size of bar, $3'' \times .65 = 1.95$ square inches.
Gauged length, 30″.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
1,950	1,000			
9,750	5,000	.0044		
15,600	8,000	.0077		
19,500	10,000	.0099		
	1,000		0.	
23,400	12,000	.0120		
29,250	15,000	.0153		
	1,000		0.	
35,100	18,000	.0189		
39,000	20,000	.0211		
	1,000		.0009	
40,950	21,000	.0227		
42,900	22,000	.0237		
44,850	23,000	.0249		
46,800	24,000	.0260		
48,750	25,000	.0277		E = 28,347,000.
	1,000		.0019	
50,700	26,000	.0290		
52,650	27,000	.0308		
54,600	28,000	.0320		
56,550	29,000	.0339		
58,500	30,000	.0361		
	1,000		.0049	
60,450	31,000	.0389		
62,400	32,000	.0417		
	32,000	.0427		After 3 minutes rest.
	32,000	.0429		After 5 minutes rest.
64,350	33,000	.0449		
66,300	34,000	.0487		
68,250	35,000	.0559		
70,200	36,000	.065		Yielding still continuing.
103,300	52,970			Ultimate strength.
0	0	2 24		=7.5 per cent.

Fractured 1″ outside of gauged length.
Appearance of fractures: Granular, 92 per cent.; fibrous, 8 per cent.
Area at fracture, $2''.92 \times .60 = 1.752$ square inches.
Contraction of area, 10 per cent.

No. 341.

Tensile test of Specimen B.

Size of bar, $3'' \times .503 = 1.509$ square inches.
Gauged length, 30″.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
1,509	1,000	0.		
9,545	5,000	.0060		
12,072	8,000	.0080		
15,090	10,000	.0101		
	1,000		0.	
18,108	12,000	.0122		
24,635	15,000	.0170		

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Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
.....	1,000	.....	.0001	
27,162	18,000	.0190	.....	
30,180	20,000	.0215	.....	
.....	1,000	.....	.0008	
33,196	22,000	.0242	.....	
36,216	24,000	.0270	.....	
37,725	25,000	.0285	.....	E = 27,376,000.
.....	1,000	.....	.0022	
39,234	26,000	.0302	.....	
40,743	27,000	.0321	.....	
42,252	28,000	.0340	.....	
43,761	29,000	.0368	.....	
45,270	30,000	.0398	.....	
.....	1,000	.....	.0080	
46,779	31,000	.0440	.....	
48,288	32,000	.0482	.....	
49,797	33,000	.0542	.....	
51,306	34,000	.065	.....	Yielding continues; stretch not all taken out which this load would cause.
65,400	43,340	.....	.....	Ultimate strength.
0	0	.78	.....	= 2.6 per cent.

Area at fracture, $2''.96 \times ''.49 = 1.45$ square inches; contraction of area, 3.9 per cent.

Fracture: Granular, 95 per cent.; fibrous, 05 per cent.

Appearance of bar not clean; seamy.

No. 342.

Tensile test of Specimen C.

Size of bar, $4''.003 \times ''.752 = 3.01$ square inches.

Gauged length, 30″.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,010	1,000	0.	.....	
15,050	5,000	.0046	.....	
24,080	8,000	.0078	.....	
30,100	10,000	.0102	.....	
.....	1,000	.....	.0008	
36,120	12,000	.0128	.....	
45,150	15,000	.0159	.....	
.....	1,000	.....	.0009	
54,180	18,000	.0199	.....	
60,200	20,000	.0238	.....	E = 28,500,000.
.....	1,000	.....	.0038	
66,220	22,000	.0296	.....	
72,240	24,000	.0399	.....	
75,250	25,000	.0518	.....	
.....	1,000	.....	.0256	
146,400	48,640	.....	.....	Ultimate strength.
0	0	5.25	.....	= 17.5 per cent.

Area at fracture, $3''.67 \times ''.66 = 2.42$ square inches.

Contraction of area, 19.6 per cent.

Fibrous fracture, good appearance.

Began to break on one edge, extending across.

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No. 343.

Tensile test of Specimen D.

Size of bar, 4″×″.756 = 3.024 square inches.
Gauged length, 30″.

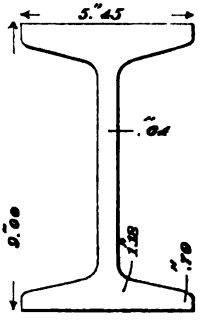
Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,024	1,000	.0		
15,120	5,000	.0044		
24,192	8,000	.0077		
30,240	10,000	.0099		
	1,000		.0001	
	1,000		.0001	
36,288	12,000	.0117		
45,360	15,000	.0151		
	1,000		.0001	
54,432	18,000	.0186		
60,480	20,000	.0211		E = 28,078,000.
	1,000		.0008	
66,528	22,000	.0254		
69,552	23,000	.0276		
72,576	24,000	.0306		
75,600	25,000	.0357		
	1,000		.0106	
78,624	26,000	.0431		Yielding continues.
81,648	27,000	.0590		Do.
147,100	48,640			Ultimate strength.
0	0	3.95		= 13.2 per cent.

Area at fracture, 3″.74×″.68 = 2.543 square inches.
Contraction of area, 15.9 per cent.
Fracture: Fibrous, 90 per cent; granular, 10 per cent.
Fracture began at edge of bar.
This bar was not straight—slightly concave on the side that measurements of elongation were taken.

No. 344.

Test by compression of I *beam.*

SPECIMEN E.



Total length, 57″.06.
Weight, 228 pounds.
Sectional area, 14.4 square inches.
Gauged length, 50″.

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Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
14,400	1,000	0.	.....	
72,000	5,000	.0058	.....	
115,200	8,000	.0108	.....	
144,000	10,000	.0142	.....	
.....	1,000	.....	.0014	
.....	10,000	.0145	.....	
.....	1,000	.....	.0014	
172,800	12,000	.0175	.....	
216,000	15,000	.0230	.....	
.....	1,000	.....	.0010	
.....	15,000	.0230	.....	
.....	1,000	.....	.0014	
259,200	18,000	.....	.....	
288,000	20,000	.0330	.....	E = 31,250,000.
.....	1,000	.....	.0026	
.....	18,000	.0298	.....	
.....	20,000	.0330	.....	
.....	1,000	.....	.0026	
316,800	22,000	.0370	.....	
345,600	24,000	.0415	.....	
360,000	25,000	.0440	.....	
.....	1,000	.....	.0059	
374,400	26,000	.0475	.....	
388,800	27,000	.0500	.....	
403,200	28,000	.0534	.....	
417,600	29,000	.0585	.....	
432,000	30,000	.0630	.....	
.....	30,000	.0660	.....	After 5 minutes' rest.
.....	1,000	.....	.0195	
460,800	32,000	.0835	.....	
.....	32,000	.0922	.....	After 4 minutes' rest.
545,100	37,854	.....	.....	Ultimate strength.

Beam failed by horizontal deflection, or in the direction perpendicular to the web, beam taking triple flexure.

When deflection reached about 1″, the test was discontinued. The load the beam was sustaining at the time was 538,000 pounds.

10″ Wrought Iron I Beam.

(Rolled by Union Iron Company, Buffalo, N. Y.)

Tests by tension and compression.

No. 345.

Specimen planed out of flange of beam.
Dimensions, 48″ × 3″ × ″.51.
Sectional area, 1.53 square inches.
Gauged length, 30″.
Metal has poor appearance; porous.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
1,530	1,000	0.	.....	
7,650	5,000	.0043	.....	
12,240	8,000	.0076	.....	
15,300	10,000	.0100	.....	
.....	1,000	.....	.0001	
18,360	12,000	.0121	.....	
22,950	15,000	.0156	.....	
27,540	18,000	.0192	.....	
30,600	20,000	.0221	.....	
.....	1,000	.....	.0011	
43,700	28,560	.....	.....	Elastic limit.
55,400	36,210	.....	.....	Ultimate strength.
0	0	.65	.....	= 2.2 per cent.

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Area at fracture, 2″.90 × ″.47 = 1.36 square inches.
Contraction of area, 11.1 per cent.
Appearance of fracture, dull, spongy.

No. 346.

Specimen planed out of web of beam.
Dimensions, 48″ × 3″ × ″.395.
Sectional area, 1.185 square inches.
Gauged length, 30″.

Loads applied.	Pounds per square inch.	Elongation.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
1,185	1,000	0.		
5,925	5,000	.0042		
9,480	8,000	.0072		
11,850	10,000	.0097		
	1,000		.0003	
14,220	12,000	.0122		
17,775	15,000	.0153		
21,330	18,000	.0191		
23,700	20,000	.0213		
	1,000		.0014	
29,900	25,230			Elastic limit.
52,900	44,640			Ultimate strength.
0	0	2.17		= 7.2 per cent.

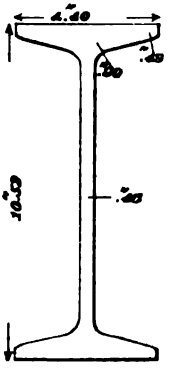
Area at fracture, 2″.90 × ″.34 = .99 square inch.
Contraction of area, 16.5 per cent.
Appearance at fracture dull, spongy; small granular spot.

No. 347.

Compression test of wrought iron.

I-BEAM.

Specimens No. 345 and No. 346 were cut off one end of this beam.



Tested with flat ends, counterweighted at middle.
Total length, 155″.45.
Total weight, 443 pounds.
Gauged length, 150″.
Sectional area, 10.26 square inches.

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Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10, 260	1, 000	0.	.....	0.	0.	
51, 300	5, 000	.0185	.....	0.	0.	
102, 600	10, 000	.0440	.....	0.	.02	
.....	1, 000	0.	0.	0.	0.	
123, 120	12, 000	.0542	.....	.05	.02	
153, 900	15, 000	.0694	.....	.10	.02	
.....	1, 000	.....	0.	0.	0.	
184, 680	18, 000	.0846	.....	.15	.05	
205, 200	20, 000	.0962	.....	.30	.10	
.....	1, 000	.....	— .0002	.09	.06	
207, 000	20, 170	.....	.....	.....	.....	Ultimate strength.

Failed by horizontal deflection.
Took sharp bend at middle.

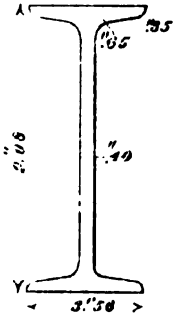
Compression tests of wrought-iron I beams.

Flat ends. Placed in testing machine with webs vertical.

No. 348.

9″ I BEAM.

(Rolled by Union Iron Company, Buffalo, N. Y.)



Total length, 191″.90.
Total weight, 365 pounds.
Sectional area, 6.85 square inches.
Gauged length, 150″.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
6, 850	1, 000	0.	.....	0.	0.	
34, 250	5, 000	.0215	.....	— .07	0.	
54, 800	8, 000	.0380	.....	— .11	.05	
68, 500	10, 000	.0501	.....	— .20	.06	
.....	1, 000	.....	0.	0.	0.	
82, 200	12, 000	.0665	.....	— .43	.04	
85, 380	12, 460	.....	.....	— .78	0.	Ultimate strength.

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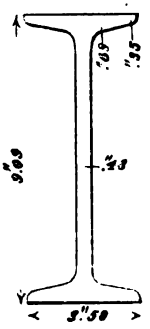
After passing the ultimate load, strains were continued, the horizontal deflection increasing rapidly, but not with a sudden spring.

When the horizontal deflection had reached 3″.7, the load sustained was 40,000 pounds.

No. 349.

Duplicate of beam No. 348.



Total length, 191″.90.
Total weight, 381 pounds.
Gauged length, 150″.
Sectional area, 7.15 square inches.

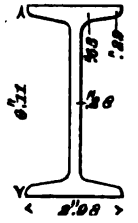
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
7,150	1,000	0.	.....	0.	0.	
35,750	5,000	.0208	.....	− .07	0.	
57,200	8,000	.0375	.....	− .13	0.	
71,500	10,000	.0495	.....	− .25	0.	
.....	1,000	.....	0.	0.	0.	
85,200	.....	.....	.....	− .82	0.	Ultimate strength.

Failed by horizontal deflection.

No. 350.

6″ I BEAM.

(Rolled by Union Iron Company.)



Length, 119″.85.
Weight, 139 pounds.

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Sectional area, 4.18 square inches.
Gauged length, 100″.

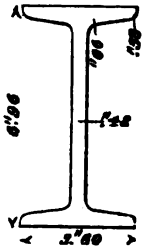
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
4, 180	1, 000	0.	.....	0.	0.	
20, 900	5, 000	.0130	.....	0.	0.	
33, 440	8, 000	.0234	.....	— .01	0.	
41, 800	10, 000	.0302	.....	— .03	0.	
.....	1, 000	.....	0.	0.	0.	
50, 160	12, 000	.0372	.....	— .03	0.	
101, 200	24, 210	.....	.....	— .60	.....	Ultimate strength.

Failed by horizontal deflection.

No. 351.

7″ I BEAM.

(Rolled by Union Iron Company.)



Total length, 180″.33.
Total weight, 303 pounds.
Sectional area, 6.05 square inches.
Gauged length, 150″.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
6, 050	1, 000	0.	.....	0.	0.	
30, 250	5, 000	.0270	.....	— .08	— .03	
48, 400	8, 000	.0445	.....	— .15	— .04	
60, 500	10, 000	.0570	.....	— .23	— .04	
.....	1, 000	.....	.0006	0.	0.	
76, 200	12, 000	.0761	.....	— .43	— .04	
84, 650	12, 990	.....	.....	— .95	— .02	Ultimate strength.

Failed by horizontal deflection.

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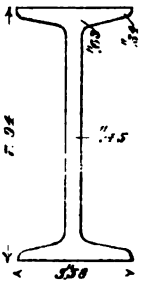
No. 352.

8″ I BEAM.

(Rolled by Union Iron Company, Buffalo, N. Y.)



Total length, 192″.04.
Total weight, 355 pounds.
Sectional area, 6.65 square inches.
Gauged length, 150″.

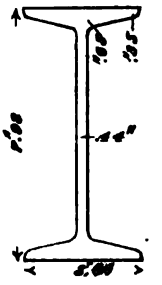
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
6,650	1,000	0.	.....	0.	0.	
33,250	5,000	.0190	.....	+ .07	— .02	
53,200	8,000	.0340	.....	.11	— .04	
6,650	10,000	.0430	.....	.16	— .04	
.....	1,000	.....	— .0010	.04	0.	
Released strain and changed packing behind the ends.						
.....	1,000	0.	0.	0.	0.	New gaugings began.
.....	5,000	.0210	.....	0.	0.	
.....	8,000	.0372	.....	— .05	0.	
.....	10,000	.0485	.....	— .12	0.	
.....	1,000	.....	0.	0.	0.	
79,800	12,000	.0630	.....	— .35	0.	
83,400	12,540	.....	.....	—1.05	0.	Ultimate strength.

Failed by horizontal deflection.

No. 353.

8″ BEAM.

Duplicate of No. 352.



Total length, 192″.90.
Total weight, 353 pounds.
Sectional area, 6.59 square inches.
Gauged length, 150″.

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Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
6,590	1,000	0.	.....	0.	0.	
32,950	5,000	.0212	.....	0.	— .06	
52,720	8,000	.0368	.....	0.	— .10	
65,900	10 000	.0470	.....	0.	— .10	
.....	1,000	.....	— .0002	0.	— .04	
79,080	12,000	.0570	.....	0.	— .10	
92,300	14,010	.....	.....	+ .50	— .10	Ultimate strength.

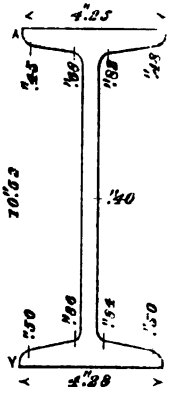
Failed by horizontal deflection.

After the ultimate load had been passed and the deflection had reached about 1″.25, the beam suddenly sprung laterally.

No. 356.

10″ Wrought Iron I Beam.

(Rolled by Union Iron Company, Buffalo, N. Y.)



Total length, 215″.88.

Gauged length, 200″.

Weight, 561 pounds.

Sectional area, 9.3 square inches.

Counterweighted at middle. Ends did not come to good bearing; required about ″.05 brass packing; maximum amount.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
9,300	1,000	0.	.....	0.	0.	
46,500	5,000	.0271	.....	0.	0.	
74,400	8,000	.0490	.....	0.	—.02	
93,000	10,000	.0665	.....	0.	—.04	
9,300	1,000	.....	.0050	0.	—.02	
111,600	12,000	.0844	.....	— .03	—.06	
120,900	13,000	.0940	.....	— .05	—.06	
130,200	14,000	.1029	.....	— .08	—.06	
139,500	15,000	.1125	.....	— .17	—.06	
9,300	1,000	.....	.0150	0.	—.04	
149,000	16,020	.....	.....	— .70	—.05	
.....	.....	.....	.....	—1.20	.....	Ultimate strength.
9,300	1,000	.....	.....	— .20	.....	Maximum deflection

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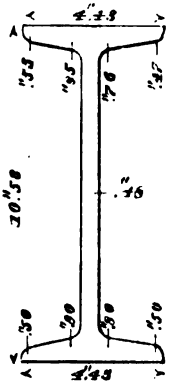
No. 357.

10″ I BEAM.

(Union Iron Company, Buffalo, N. Y.)



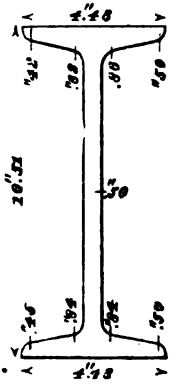
Total length, 264″.08.
Gauged length, 250″.
Sectional area, 10.19 square inches.
Weight, 747 pounds.
Counterweighted at middle.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,100	1,000	0.	.....	0.	0.	
50,950	5,000	.0335	.....	+ .07	+ .02	
81,520	8,000	.0604	.....	.12	.03	
101,900	10,000	.0785	.....	.25	.03	
.....	1,000	.....	.0020	.03	.02	
113,100	11,100	.....	.....	1.00	.03	Ultimate strength.
.....	1,000	.....	.....	.08	.02	

No. 358.

10″ I BEAM.

(Union Iron Company, Buffalo, N. Y.)



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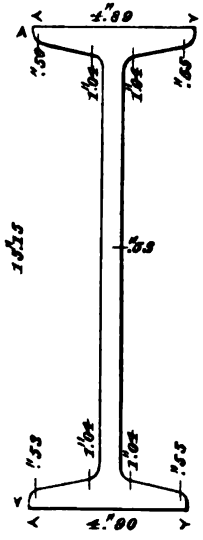
Total length, 264″.08.
Gauged length, 250″.
Sectional area, 10.46 square inches.
Weight, 767 pounds.
Counterweighted at middle.
Ends come to a good bearing.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,460	1,000	0.	.....	0.	0.	
52,300	5,000	.0356	.....	.20	0.	
83,680	8,000	.0629	.....	.23	0.	
104,600	10,000	.0820	.....	.70	0.	
.....	1,000	.....	0.	0.	0.	
107,800	10,306	.....	.....	1.14	0.	Ultimate strength.
.....	1,000	.....	.....	.05	0.	
		Per deflection increased.				
.....	1,000	.....	.....	.36	0.	
82,000	.....	.....	.....	3.00	.....	Sustains after above per deflection.

No. 359.

15″ WROUGHT-IRON I BEAM.

(Union Iron Company, Buffalo, N. Y.)



Total length, 264″.
Gauged length, 250″.
Sectional area, 14.8 square inches.
Weight, 1,085 pounds.
Counterweighted at middle.

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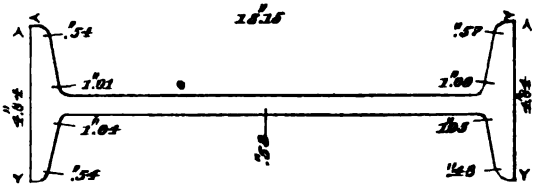
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
14,800	1,000	0.	.....	0.	0.	
74,000	5,000	.0350	.....	0.	0.	
118,400	8,000	.0612	.....	0.	0.	
148,000	10,000	.0852	.....	— .07	0.	
.....	1,000	.....	.0060	0.	0.	
177,600	12,000	.....	.....	— .20	0.	
184,700	12,400	.....	.....	— .70	0.	Ultimate strength.

No. 360.

WROUGHT-IRON I BEAM.



Total length, 263″.95.
Gauged length, 250″.
Sectional area, 14.74 square inches.
Weight, 1,081 pounds.
Counterweighted at middle.
Ends come to good bearing without packing.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
14,740	1,000	0.	.....	0.	0.	
73,700	5,000	.0365	.....	0.	0.	
117,920	8,000	.0635	.....	0.	0.	Snapping sounds heard when load exceeded 8,000 pounds per square inch.
147,400	10,000	1.0920	.....	+ .02	0.	
.....	1,000	.....	.0130	0.	0.	
176,880	12,000	.....	.....	.08	0.	
187,000	12,686	.....	.....	.70	0.	Ultimate strength.

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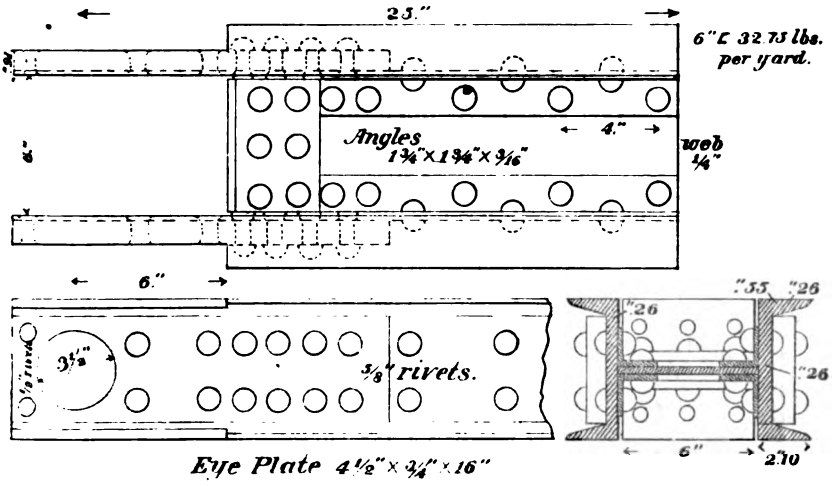
Compression of pin ends of wrought iron posts.

No. 391.

Tested with one pin end, one flat end.



Eye Plate 4½"×¾"×16"

Ultimate strength, 393,000 pounds.

Specimen tested with one pin end, one flat end. Pin in vertical position.

Post failed by deflecting perpendicular to axis of pin, buckling the flanges of the channel bars. The eye-plates were bent concave, and also the webs of channel bars, from the inside of the post.

Fracture of the channel-bar web occurred along one row of rivet holes, where riveted to eye-plate.

The pin ends were bent inward.

Strains were very gradually increased; yielding took place slowly.

No. 392.

Compression of short pin and post.

Duplicate of No. 391.

Ultimate strength, 415,000 pounds.

This post failed in a manner similar to No. 391, but without horizontal deflection. Each pin end bent inward. This failure occurred about the same time the channel-bar webs and eye-plates were bent concave from the inside of the post.

The concave bending of the webs was accompanied by outward buckling of the channel-bar flanges as far as the eye-plate reached.

Cripling was carried on till one channel-bar web cracked along the line of rivets which connects it to the eye-plate.

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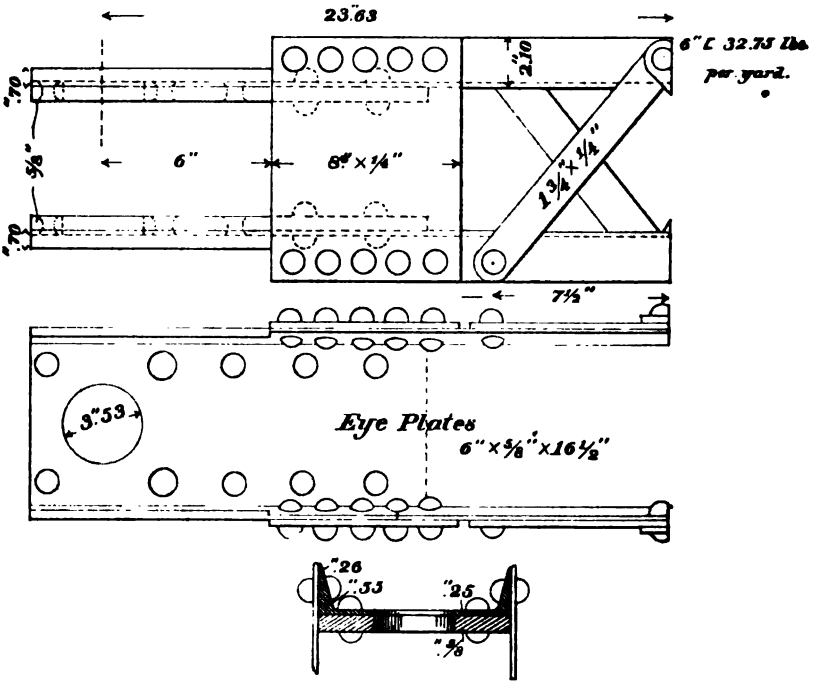
No. 393.

Tested with one pin end, one flat end.



⅝″ rivets, except two end rivets, ½″ each.

Same size channels as used in Nos. 391 and 392, punched holes.

Ultimate strength, 302,600 pounds.

Post failed by buckling the web and flanges of channel bars between flat end and side plates.

Secondary bending took place at the pin end, after considerable buckling had been given the channel bars.

No. 394.

Duplicate of No. 393.

Ultimate strength, 302,200 pounds.

Failed the same as No. 393.

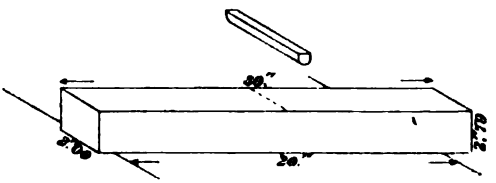
Slight bend of pin ends took place about the same time the channel bars buckled.

No. 361.

Transverse test of wrought-iron bar.

Hammered iron, very full of seams.

Specimen dressed all over.



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End bearings 20″ apart.
Loaded at middle.
Middle bearing semicircular, ½″ radius.

Loads applied.	Δ	Δ set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
500	.0036	.....	Loads released to zero when measuring Δ sets.
1,000	.0044	.0001	
1,500	.0051	.....	
2,000	.0061	.....	
2,500	.0070	.....	
3,000	.0078	.0002	
4,000	.0097	.....	
5,000	.0116	.0002	
6,000	0131	.....	
7,000	.0148	.....	
8,000	.0154	.0003	
9,000	.0183	.....	
10,000	.0201	.....	
11,000	.0218	.....	
12,000	.0236	.0009	
13,000	.0257	.....	
14,000	.0279	.....	
15,000	.0301	.0023	
16,000	.0332	.....	
17,000	.0380	.0066	
18,000	.0551	.0220	
19,000	.0901	.....	
20,000	.1380	.1002	
21,000	.177	.....	
22,000	.226	.184	Micrometer removed.
23,000	.27	.....	
24,000	.35	.....	
25,000	.41	.....	
27,000	.55	.....	
30,000	.85	.....	
35,000	1.74	.....	
40,000	3.05	.....	
43,800	*5.5	.....	Ultimate strength.

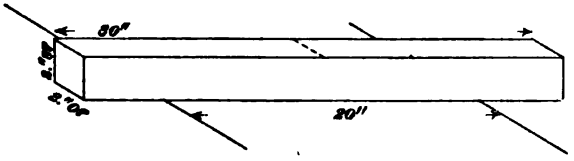
*About.

Test discontinued when the bar had been bent about 85°.
A 3″ section laid off on the tension side at the middle before the test began now measures 4″.27.
Elongation of outside fibers, 42 per cent.

No. 1590.

Transverse test of gun iron for South Boston Iron Company.

Specimen dressed all over.



20″ between end supports.
Loaded at middle.
Middle bearing semicircular, ½″ radius.

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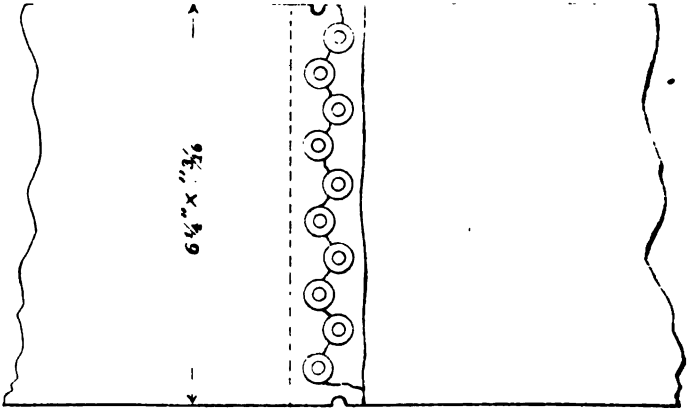
Loads applied.	Δ	Δ set.	Remarks.
Pounds.	*Inch.*	*Inch.*	
500	.0017	.....	Loads released to zero load when Δ sets were measured.
1,000	.0030	.0002	
1,500	.0040	.....	
2,000	.0054	.0002	
2,500	.0070	.....	
3,000	.0082	.0003	
3,500	.0088	.....	
4,000	.0102	.0002	
4,500	.0112	.....	
5,000	.0124	.0001	
5,500	.0137	.....	
6,000	.0152	.0001	
6,500	.0160	.....	
7,000	.0172	.0002	
7,500	.0183	.....	
8,000	.0194	.0005	
8,500	.0207	.....	
9,000	.0220	.0007	
9,500	.0230	.....	
10,000	.0242	.0008	
10,500	.0257	.....	
11,000	.0267	.0012	
11,500	.0299	.....	
12,000	.0294	.0014	
12,500	.0304	.....	
13,000	.0317	.0017	
13,500	.0332	.....	
14,000	.0344	.0022	
14,500	.0357	.....	
15,000	.0372	.0027	
15,500	.0387	.....	
16,000	.0400	.0032	
17,000	.0427	.....	
18,000	.0454	.0042	
19,000	.0487	.....	
20,000	.0520	.0062	
21,000	.0554	.....	
22,000	.0592	.0084	
23,000	.0630	.....	
24,000	.0672	.0120	
29,600	.....	.....	Ultimate strength.

Tensile test of riveted joint in white-oak tanned hose leather.

Section of 3″ hose cut apart and joint tested.

No. 324.



Gross sectional area of leather, 1.17 square inch.
Ten rivets about 2″ diameter.

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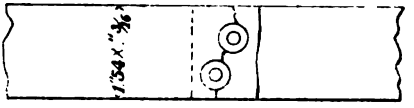
Galvanized rivets and burrs.
Ultimate strength, 3,100 pounds = 2,650 pounds per square inch on gross section.
Fractured first through middle sections of joint.
Fracture occurring on side of joint having burrs.
Heads of rivets cup-shaped; burrs flat.

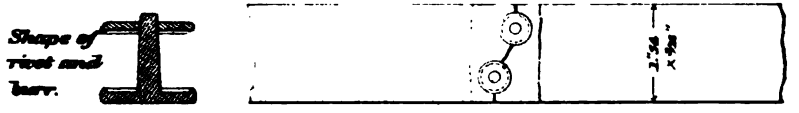
No. 325.

Specimen made from same leather as No. 324.



Two rivets, with flat heads and flat burrs.
Galvanized rivets and burrs.
Ultimate strength, 640 pounds.
Fractured leather next rivet heads.
Fractures began at rivet holes.

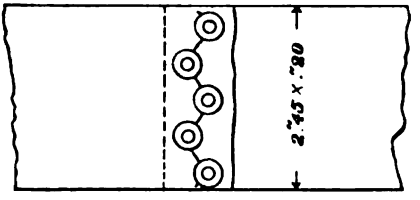
No. 326.



Two rivets, with cup shaped heads and burrs.
Galvanized rivets.
Ultimate strength, 670 pounds.
Fractures began at rivet holes.
Tore leather on burr side of specimen.

No. 611.

Old specimen of leather hose.



Five rivets, about ".21 diameter, copper, galvanized.
Leather about rivets coated with verdigris.
Ultimate strength, 1,280 pounds = 256 pounds per rivet.
Fractured on the burr side of joint, beginning at middle of specimen.

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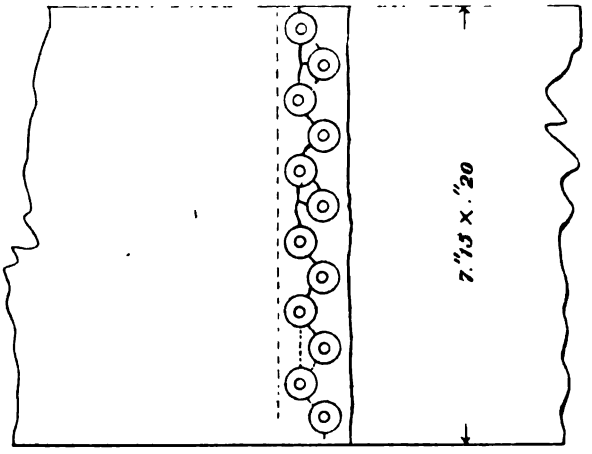
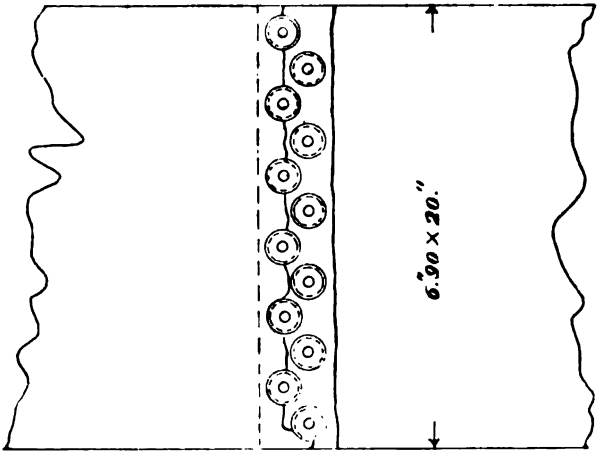
No. 612.

New specimen of leather hose.



Twelve rivets, with flat heads and flat burrs.
Rivets and burrs copper, galvanized.
Ultimate strength, 4,050 pounds = 337 pounds per rivet.
Fractures began at each side, on the burr side tearing across four rivet holes.
Opposite side of joint tearing across nine rivet holes.

No. 613.



Twelve copper rivets, with cup-shaped heads and cup-shaped burrs; heads galvanized.
Copper burrs not galvanized.
Ultimate strength, 4,210 pounds = 351 pounds per rivet.
Fractured across specimen through one row of rivet holes on the burr side of the joint.

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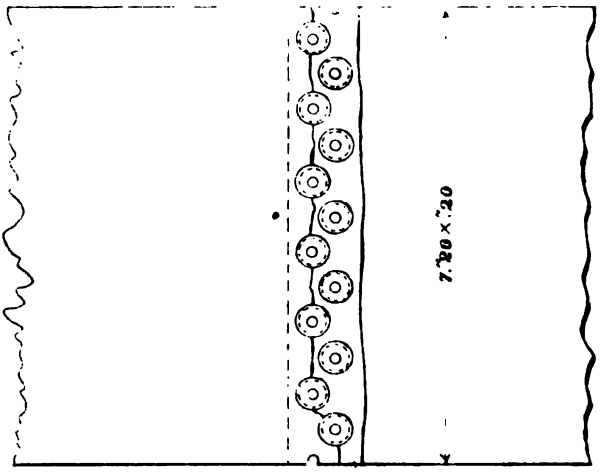
No. 614.



Twelve copper rivets, with cup-shaped heads and burrs.
Rivets galvanized, burrs made of brass, not galvanized.
Ultimate strength, 4,380 pounds = 365 pounds per rivet.
Specimen fractured on the side of the rivet heads, the fracture beginning at one edge and tearing across through one row of rivet holes.
Specimens Nos. 612, 613, and 614 made from the same piece of leather.

Compression of cast iron.

DESCRIPTION OF CASTINGS.

. indicates Providence gun iron, dry sand slack heating.
. . indicates Providence gun iron, dry sand hot.
. . . indicates gray iron, dry sand.
. . . . indicates gray iron, wet sand.
Bars cylindrical, in the condition they came from the molds, ends faced off.
Tested between flat steel faces.

No. 363.

Mark on bar, .
Length, 14″.95.
Diameter, 1″.75.
Sectional area, 2.4 square inches.
Ultimate strength, 149,200 pounds = 62,170 pounds per square inch.

No. 364.

Mark on bar, . .
Length, 14.″97.
Diameter, 1″.77.
Sectional area, 2.46 square inches.
Ultimate strength, 167,400 pounds = 68,050 pounds per square inch,

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No. 365.

Mark on bar, . . .

Length, 13″.98.
Diameter, 1″.75.
Sectional area, 2.4 square inches.
Ultimate strength, 158,000 pounds = 65,830 pounds per square inch.

No. 366.

Mark on bar, ...

Length, 14″.97.
Diameter, 1″.76.
Sectional area, 2.43 square inches.
Ultimate strength, 198,000 pounds = 81,810 pounds per square inch.

Indentation of copper with circular indenting tool.

[Three cuts made in each copper.]

Number of experiment.	Mark on copper.	Size of copper. Length.	Width.	Thickness.	Pounds pressure on indenting tool.	Length of cut.	Mean length of cut.	Remarks.
		Inch.	*Inch.*	*Inch.*		*Inch.*	*Inch.*	
367	A	.94	1.6	.48	500	.50−	.497	
					500	.49		
					500	.50−		
368	B	.94	1.6	.48	750	.58½	.583	
					750	.58		
					750	.58⅝		
369	C	.96	1.6	.48	1,000	.64⅛	.64	
					1,000	.63½		
					1,000	.64		
370	D	1.04	1.6	.48	1,250	.71	.705	
					1,250	.70−		
					1,250	.70½		
371	E	1.10	1.6	.48	1,500	.75	.743	Perceptible swelling of the sides of coppers.
					1,500	.73		
					1,500	.75−		
372	F	1.23	1.6	.48	2,000	.84⅛	.84	
					2,000	.83⅞		
					2,000	.84		
373	H	1.43	1.6	.48	2,500	.90⅛	.898	
					2,500	.89		
					2,500	.90		
374	G	1.44	1.6	.48	3,000	.98	.963	
					3,000	.95		
					3,000	.96		
375	I	1.52	1.6	.48	3,500	1.02	1.01+	
					3,500	1.00		
					3,500	1.02		
376	J	1.52	1.6	.48	4,000	1.08⅛	1.07⅛	
					4,000	1.06		
					4,000	1.08		
377	K	1.54	1.6	.48	4,500	1.12⅛	1.117	
					4,500	1.10−		
					4,500	1.12⅛		
378	L	1.69	1.6	.48	5,000	1.17⅛	1.163	
					5,000	1.14⅛		
					5,000	1.17−		
379	M	1.84	1.6	.48	6,000	1.25	1.23	
					6,000	1.21		
					6,000	1.23		
380	N	1.90	1.6	.48	7,000	1.31	1.293	
					7,000	1.27⅛		
					7,000	1.29⅛		
381	O	1.99	1.6	.48	8,000	1.37⅛	1.355	
					8,000	1.33⅛		
					8,000	1.35⅛		

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The lengths are recorded in the order they were made. The cuts were spaced so as to divide the width of each copper into four equal (or nearly so) parts.

An outside cut was made first, then the middle cut, and finally an outside cut.

REMARKS ON THE COMPRESSION TESTS OF TIMBER POSTS.

Posts were tested in a horizontal position between flat cast-iron platforms. Those of rectangular cross-section were placed in the testing-machine with their longer sides vertical.

The vertical dimension is recorded in the notes as depth of post; the horizontal dimension, width of post.

To insure straightness the sticks were dressed immediately before testing. Such as were found badly warped before dressing were measured, and the amount of deflection recorded on the sketches. The letter *c* in connection with figures shows how much the stick was concave on that side. The letter *x* shows that the side to which it refers was convex before dressing. It was intended to determine whether the distortion of seasoning fixed the direction of deflection when tested as a post.

The deflections while under test were indicated by a pointer secured to the middle of the post and having an arm about 24″ long, reaching out to a dial secured to one of the main screws of the testing-machine.

It was observed that many sticks took an apparent deflection in the direction parallel to their longer side. This led to the employment of a pointer about 48″ long, which was secured at its middle to the post.

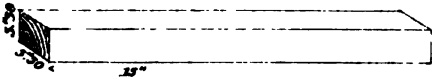
Readings taken on each side showed that the posts frequently had a spiral movement when loaded.

Compressions were measured within the gauged length. The ends of the measuring rods were secured in center punch-marks in the heads of screws driven in the wood.

The direction of the rings of yearly growth are correctly represented on the sketches of the specimens.

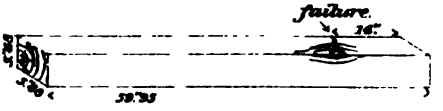
COMPRESSION TESTS OF WHITE-PINE POSTS.

No. 511.



Weight, 7 pounds.
Sectional area, 30.25 square inches.
Ultimate strength, 108,000 pounds = 3,570 pounds per square inch.
Fibers crushed at middle of block.

No. 491.



Weight, 26½ pounds.
Sectional area, 30 square inches.
Ganged length, 50″.

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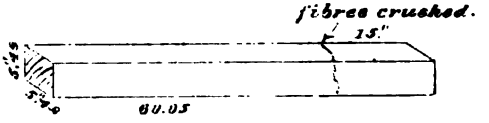
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,000	100	0.		
15,000	500	.0145		
3,000	100		.0005	
30,000	1,000	.0340		
3,000	100		.0	
45,000	1,500	.0540		
3,000	100		.0003	
60,000	2,000	.0738		
3,000	100		.0	
111,000	3,700			Ultimate strength.

Failed suddenly by the fibers crushing at a knot $1\frac{3}{4}''$ diameter $14''$ from end of post.

No. 492.

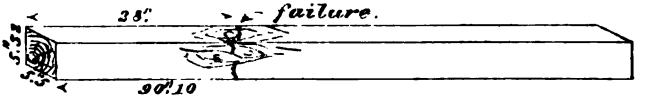


Weight, 31 pounds.
Sectional area, 30 square inches.
Gauged length, 50″.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,000	100	0.		Post free from knots.
15,000	500	.0195		
3,000	100		0.	
30,000	1,000	.0450		
3,000	100		.0005	
45,000	1,500	.0708		
3,000	100		.0010	
60,000	2,000	.0962		
3,000	100		.0015	
99,300	3,310			Ultimate strength.

Failed suddenly by the fibers crushing 15″ from end of stick.

No. 493.



Weight, $43\frac{1}{2}$ pounds.
Sectional area, 30.4 square inches.
Gauged length, 50″.

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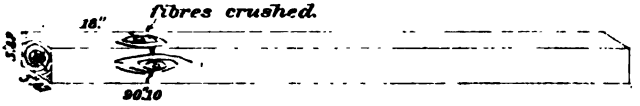
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,040	100	0.		This stick contains 12 knots from ¾" to 2¼" diameter.
15,200	500	.0280		
3,040	100		.0010	
30,400	1,000	.0689		
3,040	100		.0020	
45,600	1,500	.1020		
3,040	100		.0035	
60,800	2,000	.1580		
3,040	100		.0122	
67,400	2,217			Ultimate strength.

Fibers crushed and longitudinal seams opened 28" from end of stick, in the vicinity of several knots.

No. 494.

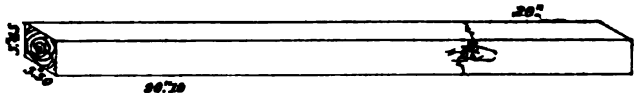


Weight, 37½ pounds.
Sectional area, 29.9 square inches.
Gauged length, 50".

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,990	100	0.		Stick contains eleven knots, 1" diameter.
14,950	500	.0150		
2,990	100		0.	
29,900	1,000	.0340		
2,990	100		.0002	
44,850	1,500	.0535		
2,990	100		.0005	
59,800	2,000	.0748		
2,990	100		.0010	
70,800	2,368			Ultimate strength.

Failed at five knots 16" from end.

No. 495.



Weight, 45 pounds.
Sectional area, 29.8 square inches.
Ultimate strength, 74,100 pounds = 2,487 pounds per square inch.
Failed from 20" to 25" from end where the stick was cross-grained and had some knots.

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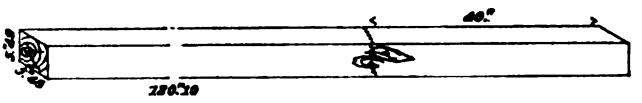
No. 512.

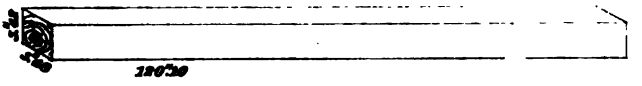


Weight, 62½ pounds.
Sectional area, 30.1 square inches.
Gauged length, 100″.
Not counterweighted.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
2,010	100	0.	.....	0.	0.	
15,050	500	.0345	.....	.01	0.	
2,010	100	.....	0.	0.	0.	
30,100	1,000	.0775	.....	.03	—.05	
.....	100	.....	.0008	0.	0.	
45,150	1,500	.1206	.....	.07	—.08	
.....	100	.....	.0013	0.	0.	
60,200	2,000	.1655	.....	.10	—.10	
.....	100	.....	.0025	0.	—.01	
70,000	.....	.....	.....	.07	—.12	
80,000	.....	.....	.....	.17	—.18	
82,000	2,724	.....	.....	.....	.....	Ultimate strength.

Failed at some knots 40″ from end. Maximum deflection occurred at this point.

No. 519.



Sectional area, 29.7 square inches.
Gauged length, 100″.
Weight, 49½ pounds.
Not counterweighted.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
2,970	100	0.	.....	0.	0.	
14,850	500	.0325	.....	0.	0.	
.....	100	.....	—.0006	0.	0.	
29,700	1,000	.0765	.....	0.	0.	
.....	100	.....	—.0004	0.	0.	
44,550	1,500	.1220	.....	0.	0.	
.....	100	.....	—.0004	0.	0.	
75,400	2,539	.....	.....	.....	.....	Ultimate strength.

Failed at some knots near middle of stick. Deflecting sideways.

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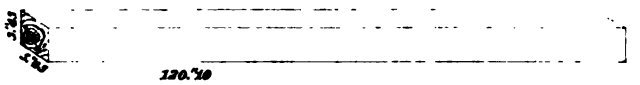
No. 520.

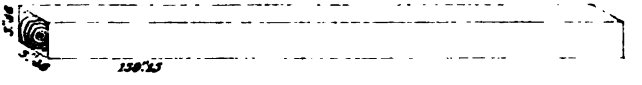


Sectional area, 29.7 square inches.
Gauged length, 100″.
Weight, 59½ pounds.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
2,970	100	0.	.....	0.	0.	
14,850	500	.0350	.....	0.	0.	
.....	100	.....	.0005	0.	0.	
29,700	1,000	.0770	.....	0.	.04	
.....	100	.....	.0007	0.	0.	
44,550	1,500	.1210	.....	0.	.08	
.....	100	.....	.0015	0.	0.	
61,700	2,077	.....	.....	—.06	.15	Ultimate strength.

Failed at some knots 30″ from end.

No. 516.



Sectional area, 29.8 square inches.
Gauged length, 100″.
Weight, 60 pounds.
Counterweight at middle, 30 pounds.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
2,980	100	0.	0.	0.	0.	
14,900	500	.0195	.....	—.04	—.01	
.....	100	.....	.0010	0.	0.	
29,800	1,000	.1015	.....	—.10	—.06	
.....	100	.....	.0020	0.	.0	
44,700	1,500	.1602	.....	—.15	—.09	
.....	100	.....	.0030	0.	—.01	
59,600	2,000	.....	.....	—.25	—.12	
68,000	2,282	.....	.....	.....	.....	Ultimate strength.

Failed at a group of knots 64″ from end.

This post had groups of knots at intervals along its length of 18″ to 24″. The failure occurred at the third group from the end.

Post now sawed apart and a block (No. 516¹, 12″ long) obtained free from knots, also a block (No. 516², 12″ long) containing a group of knots. Their ultimate compression strength obtained as below.

Blocks tested seven days after original test.

Block No. 516¹ (free from knots): Ultimate strength, 101,900 pounds = 3,420 pounds per square inch.

Block No. 516² (contains seven knots from ½″ to 1″ diameter): Ultimate strength, 89,500 pounds = 3,003 pounds per square inch.

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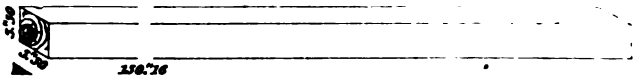
BLOCK No. 516¹. BLOCK No. 516².

No. 517.



Sectional area, 30.25 square inches.
Weight, 70 pounds.
Counterweight at middle, 35 pounds.
Gauged length, 100″.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
3,025	100	0.	0.	0.	0.	
15,125	500	.1340	.....	0.	0.	
.....	100	.....	0.	0.	0.	
30,250	1,000	.0760	.....	— .05	0.	
.....	100	.....	0.	0.	0.	
45,375	1,500	.1200	.....	— .10	0.	
.....	100	.....	.0005	0.	0.	
60,500	2,000	.....	.....	— .14	0.	
70,800	2,340	.....	.....	.....	.....	Ultimate strength.

Failed at a group of knots 58″ from end.

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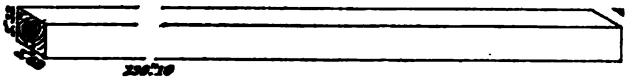
No. 518.

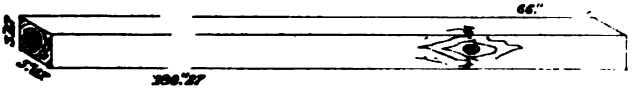


Sectional area, 30.25 square inches.
Weight, 67½ pounds.
Gauged length, 100″.
Counterweight at middle, 34 pounds.

Loads applied.	Pound s per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
3, 025	100	0.	.....	0.	0.	
15, 125	500	.0272	.....	0.	0.	
.....	100	.....	0.	0.	0.	
30, 250	1, 000	.0625	.....	0.	0.	
.....	100	.....	.0010	0.	0.	
45, 375	1, 500	.0980	.....	0.	.05	
.....	100	.....	.0010	0.	0.	
60, 500	2, 000	.....	.....	0.	.10	
100, 000	3, 306	.....	.....	0.	.12	Ultimate strength.

Failed at a group of knots 31″ from end.

No. 513.



Sectional area, 29.9 square inches.
Gauged length, 100″.
Weight, 84½ pounds.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
2, 990	100	0.	0.	0.	0.	
14, 950	500	.0300	.....	0.	0.	
.....	100	.....	.....	.....	.....	
29, 900	1, 000	.0675	.....	— .01	.10	
.....	100	.....	0.	0.	0.	
44, 850	1, 500	.0950	.....	— .06	.29	
.....	100	.....	— .0010	+ .04	— .04	
54, 000	1, 806	.....	.....	.....	.....	Ultimate strength.

Failed at a group of knots 66″ from end, deflecting sideways and upward.

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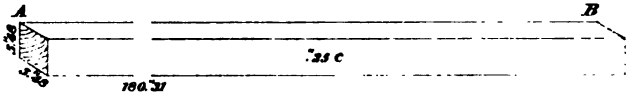
No. 514.

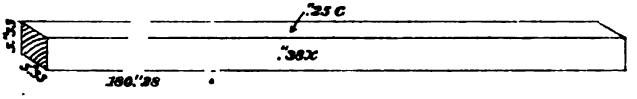


Sectional area, 30 square inches.
Gauged length, 100″.
Weight, 90 pounds.
Counterweight at middle, 45 pounds.
Initial bend before dressing down from size, 6″×6″: Horizontal, +″.25.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
6,000	200	0.	.....	0.	0.	
15,000	500	.0158	.....	0.	0.	
.....	200	.....	0.	0.	0.	
30,000	1,000	.0420	.....	0.	0.	
.....	200	.....	0.	0.	0.	
45,000	1,500	.....	.....	0.	0.	
60,000	2,000	.....	.....	0.	.05	
75,000	2,500	.....	.....	.02	.11	
90,000	3,000	.....	.....	.09	.28	
93,500	3,117	.....	.....	.....	.....	Ultimate strength.

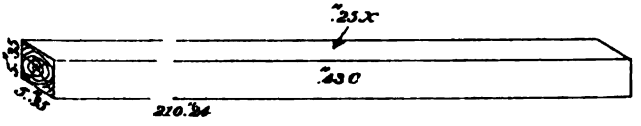
Failed by deflecting upward and sideways.
Fibers crushing at some knots 14″ from end *A*, and at some knots 24″ from end *B*.

No. 515.



Sectional area, 28.4 square inches.
Gauged length, 100″.
Weight, 91 pounds.
Counterweight at middle, 45 pounds.
Initial bend in post before dressing down from size 6″×6″: Horizontal, —″.38; vertical, —″.25.

No. 521.



Sectional area, 28.6 square inches.
Weight, 96½ pounds.
Counterweight at middle, 48 pounds.
Initial bends in stick before dressing down from size 6″×6″: Horizontal, +″.43; vertical, +″.25.

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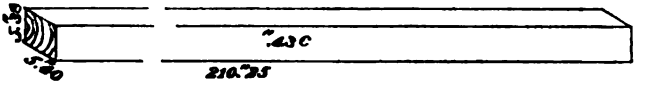
Loads applied.	Deflections.		Remarks.
	Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	
2,000	0.	—.13	
4,000	0.	—.13	
6,000	0.	—.11	
8,000	0.	—.10	
10,000	0.	—.10	
12,000	0.	—.10	
14,000	0.	—.10	
16,000	.02	—.10	
18,000	.03	—.09	
20,000	.04	—.08	
22,000	.05	—.07	
24,000	.07	—.07	
26,000	.09	—.07	
28,000	.10	—.07	
30,000	.11	—.06	
32,000	.12	—.06	
34,000	.14	—.05	
36,000	.16	—.05	
38,000	.18	—.05	
40,000	.20	—.05	
42,000	.24	—.05	
44,000	.28	—.05	
48,000	.44	—.07	
50,000	.55	—.10	
52,000	.90	—.20	
53,000	1.27	—.40	Ultimate strength =1,858 pounds per square inch.

Deflected sideways and downward.
Crushed fibers in vicinity of small knots ($\frac{1}{2}$″ diameter) at middle.

No. 522.



Sectional area, 29 square inches.
Weight, 101 pounds.
Counterweight at middle, 50 pounds.
Initial deflection in stick before dressing down from size 6″×6″: Horizontal, + ″.43.

Loads applied.	Deflections.		Remarks.
	Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	
2,000	0.	—.15	
4,000	0.	—.15	
6,000	0.	—.16	
8,000	0.	—.16	
10,000	0.	—.17	
12,000	0.	—.17	
14,000	0.	—.17	
16,000	0.	—.18	
18,000	0.	—.19	
20,000	0.	—.20	
22,000	0.	—.21	
24,000	0.	—.24	
26,000	0.	—.26	
28,000	0.	—.29	
30,000	0.	—.32	
32,000	0.	—.38	
34,000	—.02	—.45	
36,000	—.03	—.52	
38,000	—.06	—.72	
40,000	—.14	—1.05	
40,500	—.14	—1.48	Ultimate strength =1,396 pounds per square inch.

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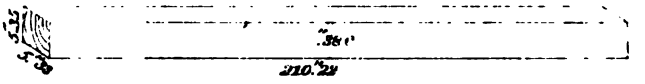
Deflected sideways and downward, opening seam (wind shake) on concave side.

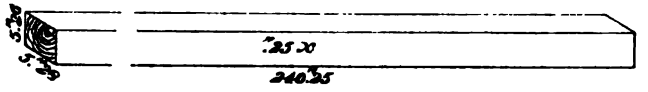
No. 523.



Sectional area, 28.5 square inches.
Weight, 95 pounds.
Counterweight at middle, 47 pounds.
Initial deflection before dressing down from size 6″ × ″6: Horizontal, + ″.38.

Loads applied.	Deflections.		Remarks.
	Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	
2,000	+ .06	— .11	
4,000	.09	— .07	
6,000	.09	— .04	
8,000	.09	— .03	
10,000	.09	— .01	
12,000	.09	0.	
14,000	.09	0.	
16,000	.09	.01	
18,000	.10	.01	
20,000	.10	.01	
22,000	.11	.01	
24,000	.12	.01	
26,000	.13	.01	
28,000	.14	.01	
30,000	.15	.01	
34,000	.17	.01	
38,000	.20	.01	
42,000	.24	.01	
46,000	.29	0.	
50,000	.36	— .02	
54,000	.47	— .05	
60,000	.70	— .19	
64,000	1.19	— .50	
64,800	.....	.....	Ultimate strength = 2,274 pounds per square inch.

No. 524.



Sectional area, 27.8 square inches.
Weight, 109½ pounds.
Counterweight at middle, 55 pounds.
Initial deflection of stick before dressing down from original size 6″ × ″6: Horizontal, — ″.25.
Seven knots in post, from ¾″ to 1¼″ diameter.

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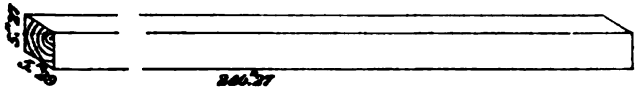
Loads applied.	Deflections.		Remarks.
	Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	
2,000	.0	.0	
4,000	—.04	.0	
6,000	—.06	—.02	
8,000	—.08	—.04	
10,000	—.10	—.06	
12,000	—.12	—.08	
14,000	—.14	—.10	
16,000	—.16	—.13	
18,000	—.18	—.16	
20,000	—.19	—.19	
22,000	—.21	—.22	
24,000	—.22	—.26	
26,000	—.25	—.29	
28,000	—.26	—.33	
30,000	—.29	—.38	
32,000	—.32	—.42	
34,000	—.35	—.50	
36,000	—.40	—.60	
38,000	—.44	—.68	
40,000	—.51	—.82	
42,000	—.62	1.04	
44,000	—.79	1.30	
45,000	1.30	1.20	Ultimate strength = 1,619 pounds per square inch.

Fibers crushed at knot near middle of post.

No. 525.



Sectional area, 27.9 square inches.
Weight, 106½ pounds.
Counterweight at middle, 53 pounds.

Loads applied.	Deflections.		Remarks.
	Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	
2,000	.04	—.17	
4,000	.04	—.17	
6,000	.04	—.19	
8,000	.04	—.20	
10,000	.04	—.21	
12,000	.06	—.22	
14,000	.07	—.24	
16,000	.10	—.26	
18,000	.12	—.28	
20,000	.14	—.30	
22,000	.17	—.33	
24,000	.20	—.36	
24,000	.20	—.36	Sustained load 5 minutes.
26,000	.24	—.40	
28,000	.30	—.45	
30,000	.36	—.50	
32,000	.45	—.58	
34,000	.55	—.66	
36,000	.73	—.80	
38,000	.96	—1.00	
39,500	1.70	—1.60	Ultimate strength = 1,416 pounds per square inch.

Failed at two knots (⅞″ × 1½″ diameter) at middle of post.

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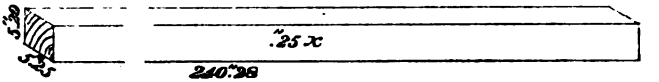
No. 526.



Sectional area, 27.8 square inches.

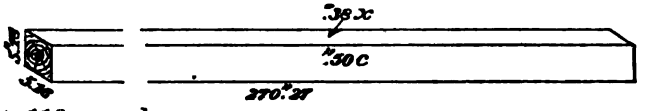
Weight, 95 pounds.

Counterweight at middle, 47 pounds.

Initial deflection in stick before dressing down from size 6″ × 6″: Horizontal, —″.25.

Loads applied.	Deflections.		Remarks.
	Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	
2,000	—.05	0.	
4,000	—.05	0.	
6,000	—.05	0.	
8,000	—.04	0.	
10,000	—.03	0.	
12,000	—.03	.01	
14,000	—.03	.01	
16,000	—.02	.02	
18,000	—.01	.03	
20,000	0.	.04	
22,000	0.	.05	
24,000	0.	.05	
26,000	.01	.06	
28,000	.03	.07	
30,000	.05	.08	
32,000	.09	.10	
34,000	.14	.10	
36,000	.27	.10	
37,000	1.88	.80	Ultimate strength = 1,331 pounds per square inch.

No. 505.



Weight, 110 pounds.

Counterweight at middle, 55 pounds.

Sectional area, 26.7 square inches.

Initial bends in post before dressing down from size 6″ × 6″: Horizontal + ″.50; vertical, + ″.38.

Loads applied.	Deflections.		Remarks.
	Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	
2,000	.04	0.	
4,000	.04	.02	
6,000	.04	.06	
8,000	.04	.11	
10,000	.04	.13	
12,000	.04	.15	
14,000	+ .02	.16	
16,000	.0	.18	
18,000	— .01	.20	
20,000	— .02	.21	
22,000	— .05	.24	
24,000	— .08	.26	
26,000	— .11	.28	
28,000	— .15	.30	
30,000	— .22	.34	
32,000	— .33	.40	
34,000	— .50	.50	
36,000	— .90	.60	
37,000	—2.50	.90	Ultimate strength = 1,386 pounds per square inch.

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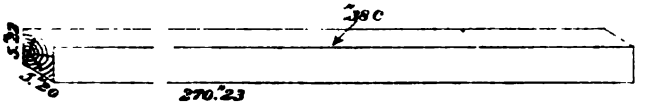
Failed by deflecting sideways and upward. When deflection reached 3″ sideways, the post suddenly sprung, increasing the deflection to 8″.

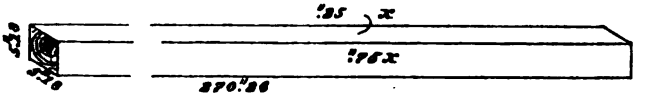
No. 506.



Weight, 113 pounds.
Counterweight at middle, 56 pounds.
Sectional area, 27.1 square inches.
Initial bend before dressing down from size 6″ × 6″: Vertical, —″.38.

Loads applied.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.	*Inch.*	*Inch.*	
2,000	0.	0.	
4,000	—.02	—.02	
6,000	—.05	—.05	
8,000	—.08	—.05	
10,000	—.09	—.06	
12,000	—.11	—.09	
14,000	—.14	—.10	
16,000	—.16	—.11	
18,000	—.18	—.12	
20,000	—.21	—.14	
22,000	—.25	—.15	
24,000	—.30	—.17	
26,000	—.34	—.18	
28,000	—.40	—.20	
30,000	—.48	—.20	
32,000	—.58	—.21	
34,000	—.80	—.20	
35,000	—1.05	—.20	
36,000	—1.35	—.20	
37,000	—1.92	—.20	
37,200	.....	.....	Ultimate strength = 1,373 pounds per square inch.

No. 507.



Weight, 118 pounds.
Counter weight at middle, 59 pounds.
Sectional area, 26.8 square inches.
Initial deflection before dressing down from size 6″ × 6″: Horizontal, —″.75; vertical, + ″.25.

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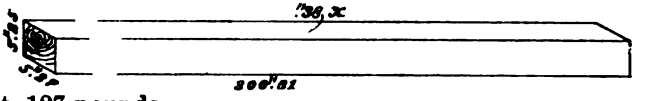
Loads applied.	Deflections.		Remarks.
	Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	
2,000	—.19	.05	
4,000	—.11	.08	
6,000	—.10	.10	
8,000	—.09	.12	
10,000	—.08	.13	
12,000	—.08	.14	
14,000	—.09	.15	
16,000	—.10	.16	
18,000	—.10	.18	
20,000	—.12	.19	
22,000	—.14	.20	
24,000	—.15	.21	
26,000	—.16	.24	
28,000	—.20	.25	
30,000	—.22	.26	
32,000	—.27	.30	
34,000	—.30	.32	
36,000	—.35	.35	
38,000	—.42	.40	
40,000	—.50	.43	
41,000	—.58	.50	
42,000	—.66	.51	
43,000	—.78	.55	
44,000	—.98	.60	
45,000	—1.21	.65	
46,000	—1.60	.70	
46,700	—2.40	.75	Ultimate strength = 1,743 pounds per square inch.

No. 502.



Weight, 127 pounds.
Counterweight at middle, 63 pounds.
Sectional area, 27.7 square inches.
Initial bend in stick before dressing down from size 6″ × 6″: Vertical, + ″.38.

Loads applied.	Deflections.		Remarks.
	Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	
2,000	—.17	.32	
4,000	—.17	.35	
6,000	—.17	.38	
8,000	—.20	.40	
10,000	—.22	.42	
12,000	—.24	.46	
14,000	—.27	.50	
16,000	—.30	.52	
18,000	—.34	.56	
20,000	—.37	.64	
21,000	—.40	.70	
22,000	—.42	.75	
23,000	—.46	.80	
24,000	—.50	.86	
25,000	—.54	.95	
26,000	—.60	1.03	
27,000	—.65	1.20	
28,000	—.74	1.35	
29,000	—.87	1.60	
30,000	—1.06	1.98	
30,900	—1.48	2.70	Ultimate strength = 1,116 pounds per square inch.

Failed by deflecting upward and sideways.

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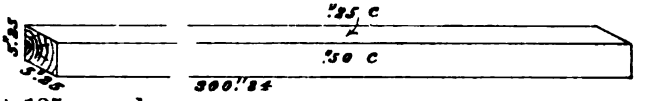
No. 503.

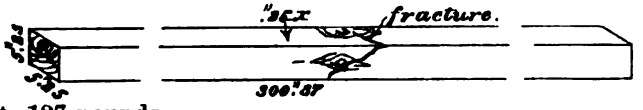


Weight, 125 pounds.
Counterweight at middle, 62 pounds.
Sectional area, 27.6 square inches.
Initial bend in post before dressing down from size 6″ × 6″: Horizontal, + ″.50; vertical, — ″.25.

Loads applied.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.	*Inch.*	*Inch.*	
2,000	+ .56	— .30	
4,000	+ .56	— .26	
6,000	+ .56	— .25	
8,000	.58	— .24	
10,000	.62	— .25	
12,000	.69	— .26	
14,000	.75	— .27	
16,000	.84	— .29	
18,000	.95	— .31	
20,000	1.10	— .35	
21,000	1.19	— .37	
22,000	1.30	— .40	
23,000	1.40	— .45	
24,000	1.60	— .50	
25,000	1.85	— .60	
25,800	.....	.....	Ultimate strength = 935 pounds per square inch.

This post had two knots at middle about $1\frac{3}{4}$″ diameter each, and corners near middle chipped off $\frac{1}{2}$″ chamfer.
When post passed maximum load and deflected sideways and downward it splintered near middle, in the vicinity of the knots.

No. 504.



Weight, 127 pounds.
Counterweight at middle, 62 pounds.
Sectional area, 27.6 square inches.
Initial bend in post before dressing down from size 6″ × 6″: Vertical, + ″.25.

Loads applied.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.	*Inch.*	*Inch.*	
2,000	+ .35	— .23	
4,000	.36	— .22	
6,000	.37	— .19	
8,000	.39	— .16	
10,000	.41	— .12	
12,000	.45	— .06	
14,000	.50	+ .02	
16,000	.55	.14	
18,000	.63	.31	
20,000	.79	.64	
21,000	.93	.95	
22,000	1.24	1.60	
22,200	.....	.....	Ultimate strength = 804 pounds per square inch.

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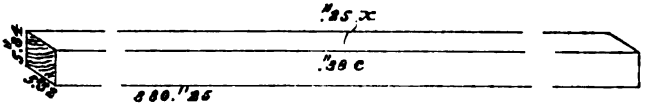
Failed by deflecting sideways and upward.
Sprung suddenly and fractured at some knots near middle.
Oblique fracture.

No. 496.



Weight, 169 pounds.
Counterweight at middle, 85 pounds.
Sectional area, 28.4 square inches.
Before dressing down from 6″×6″ stick, the post was deflected at middle: Horizontal, +″.38; vertical, +″.25, being convex on the heart side.

Loads applied.	Deflections.		Remarks.
	Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	
1,000	0.	0.	
2,000	0.	0.	
3,000	.02	0.	
4,000	.02	0.	
5,000	.02	0.	
6,000	.03	0.	
7,000	.05	.02	
8,000	.06	.04	
9,000	.08	.05	
10,000	.09	.06	
11,000	.10	.08	
12,000	.11	.10	
13,000	.13	.11	
14,000	.14	.12	
15,000	.15	.14	
16,000	.17	.17	
17,000	.18	.20	
18,000	.20	.21	
19,000	.22	.24	
20,000	.25	.27	
10,000	.10	.11	
20,000	.25	.27	
21,000	.27	.30	
22,000	.30	.34	
23,000	.35	.38	
24,000	.40	.41	
25,000	.45	.47	
26,000	.50	.52	
27,000	.58	.58	
28,000	.68	.67	
29,000	.80	.77	
30,000	.99	.93	
31,000	1.20	1.12	
32,000	1.70	1.60	
32,500			Ultimate strength = 1,144 pounds per square inch.

Failed by deflection sideways and upward, taking a sudden spring immediately after the maximum load was reached.
The deflections followed the initial bend the stick had before dressing

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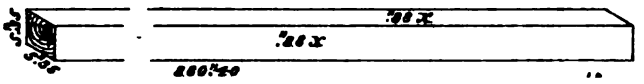
No. 497.

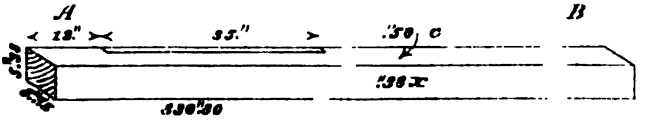


Weight, 173 pounds.
Counterweight at middle, 85 pounds.
Sectional area, 28.6 square inch.
Before dressing down from 6″×6″ stick, post had initial deflection: Horizontal, —″.38; vertical, +″.38.

Loads applied.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.	*Inch.*	*Inch.*	
1,000	0.	0.	
2,000	0.	—.02	
3,000	0.	—.04	
4,000	0.	—.04	
5,000	0.	—.04	
6,000	0.	—.04	
7,000	0.	—.04	
8,000	—.02	—.04	
9,000	—.05	—.04	
10,000	—.06	—.03	
11,000	—.07	—.02	
12,000	—.08	—.01	
13,000	—.10	0.	
14,000	—.11	0.	
15,000	—.11	0.	
16,000	—.14	.01	
17,000	—.16	.03	
18,000	—.18	.04	
19,000	—.20	.05	
20,000	—.23	.07	
21,000	—.27	.09	
22,000	—.31	.11	
23,000	—.34	.14	
24,000	—.38	.16	
25,000	—.44	.18	
26,000	—.51	.22	
27,000	—.58	.28	
28,000	—.70	.32	
29,000	—.86	.40	
30,000	—1.06	.49	
31,000	—1.32	.56	
32,000	.....	.....	Ultimate strength = 1,119 pounds per square inch.

Failed by deflection sideways and upward, following the initial direction of the bends in the upward movement and contrary to the sideways initial bend.

No. 498.



Weight, 157 pounds.
Sectional area, 28.6 square inches.
Counter weight at middle, 78 pounds.
Initial bend in post before dressing down from 6″×6″ square: Horizontal, —″.38; vertical, —″.50. Piece 5″.35×″.70×″.35 set in end *A* 12″ from end of stick.

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Loads applied.	Deflections.		Remarks.
	Horizontal.	Vertical.	
Pounds.	*Inch.*	*Inch.*	
1,000	0.	0.	
2,000	0.	0.	
3,000	0.	+ .01	
4,000	0.	.02	
5,000	0.	.04	
6,000	— .01	.05	
7,000	— .02	.07	
8,000	— .02	.08	
9,000	— .03	.09	
10,000	— .04	.10	
11,000	— .04	.11	
12,000	— .04	.12	
13,000	— .04	.14	
14,000	— .03	.15	
15,000	— .03	.16	
16,900	— .02	.18	
17,000	— .02	.20	
18,000	— .01	.21	
19,000	— .01	.22	
20,000	0.	.24	
21,000	0.	.26	
22,000	+ .01	.28	
23,000	.02	.31	
24,000	.04	.34	
25,000	.06	.38	
26,000	.12	.48	
27,000	.23	.65	
28,000	.67	1.25	Ultimate strength = 979 pounds per square inch.

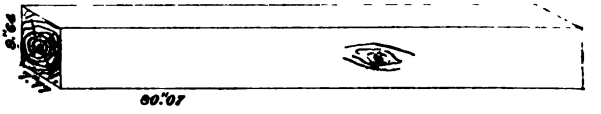
Failed by deflection sideways and upward, taking a contrary direction to the upward initial bend in the post but continuing the initial sideways bend.

The piece set in near end *A* did not appear to have caused weakness and given direction to final deflection, although it was on the concave side at final failure.

COMPRESSION OF WHITE-PINE POSTS—(Continued).

Specimens from stock 8″×10″, 6″×16″, 7″×16″, *and* 9″×17″.

No. 569.



Sectional area, 74.9 square inches.
Gauged length, 50″.
Weight, 94 pounds.
Not counterweighted.
Average rate of growth, 10 rings per inch.

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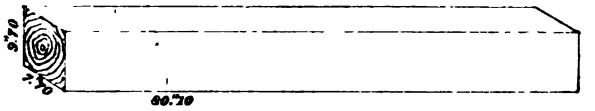
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
7,490	100	0.		
37,450	500	.0129		
	100		0.	
74,900	1,000	.0311		
	100		— .0005	
112,350	1,500	.0505		
	100			
149,800	2,000	.0704		
	100		0.	
204,000	2,724			Ultimate strength.

Failed at knots 10″ from middle of post.

No. 570.

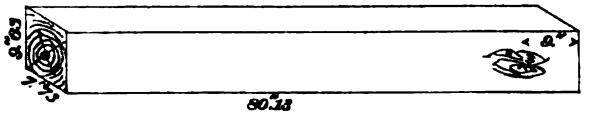


Sectional area, 74.7 square inches.
Gauged length, 50″.
Weight, 93 pounds.
Not counterweighted.
Average rate of growth, 7 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
7,470	100	0.		
37,350	500	.0150		
	100		— .0004	
74,700	1,000	.0360		
	100		— .0010	
112,050	1,500	.0580		
	100		— .0010	
149,400	2,000	.0810		
	100		.0004	
177,000	2,369			Ultimate strength.

Failed at some knots near middle of post.

No. 571.



Sectional area, 74.4 square inches.
Gauged length, 50″.
Weight, 120½ pounds.
Post contains considerable sap.
Not counterweighted.
Average rate of growth, 12 rings per inch.

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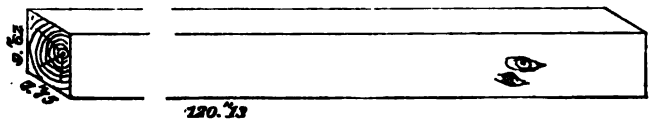
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
7,440	100	0.		
37,200	500	.0120		
	100		0.	
74,400	1,000	.0314		
	100		0.	
111,600	1,500	.0522		
	100		—.0002	
148,800	2,000	.0730		
	100		0.	
185,000	2,487			Ultimate strength.

Failed at a group of knots 9″ from end of post.

No. 575.

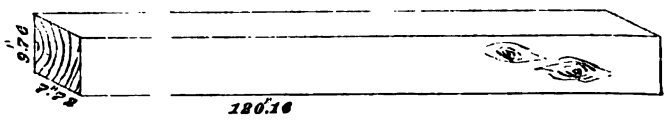


Sectional area, 74.6 square inches.
Gauged length, 100″.
Weight, 166 pounds.
Not counterweighted.
Average rate of growth, 15 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
7,460	100	0.		
37,300	500	.0302		
	100		0.	
74,600	1,000	.0695		
	100		0.	
111,900	1,500	.1110		
	100		0.	
149,200	2,000	.1537		
	100		.0010	
186,600	2,493			Ultimate strength.

Failed at some knots 21″ from end of post.

No. 576.



Sectional area, 75.3 square inches.
Gauged length, 100″.
Weight, 166 pounds.
Not counterweighted.
Average rate of growth, 11 rings per inch.

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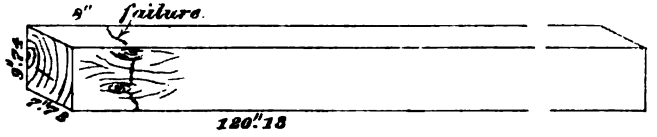
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
7,530	100	0.		
37,650	500	.0276		
	100		0.	
75,300	1,000	.0625		
	100		.0008	
112,950	1,500	.0988		
	100		.0015	
150,600	2,000	.1379		
	100		.0031	
204,600	2,717			Ultimate strength.

Failed in the vicinity of knots 13″ and 27″ from end of post.

No. 577.

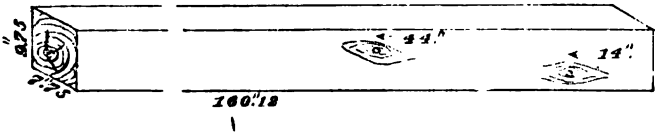


Sectional area, 75.3 square inches.
Gauged length, 100″.
Weight, 160 pounds.
Not counterweighted.
Average rate of growth, 10 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
7,530	100	0.		
37,650	500	.0268		
	100		0.	
75,300	1,000	.0657		
	100			
112,950	1,500	.1070		
	100		.0005	
135,000	1,793			Ultimate strength.

Failed at knots 8″ to 11″ from end.

No. 581.



Sectional area, 75.6 square inches.
Gauged length, 100″.
Weight, 221 pounds.
Not counterweighted.
Average rate of growth, 7 rings per inch.

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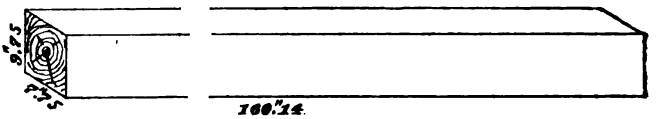
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
7,560	100	0.		
37,800	500	.0312		
	100		—.0005	
75,600	1,000	.0750		
	100		—.0005	
113,400	1,500	.1210		
	100		—.0004	
151,200	2,000	.1718		
	100		.0014	
168,000	2,222			Ultimate strength.

Failed at knots 14″ and 44″ from end.

No. 582.

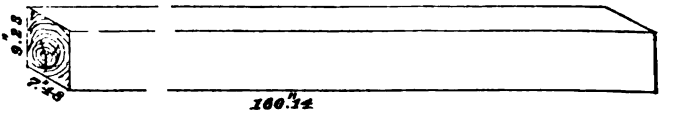


Sectional area, 75.6 square inches.
Gauged length, 100″.
Weight, 182 pounds.
Not counterweighted.
Average rate of growth, 3 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
7,560	100	0.		
37,800	500	.0510		
	100		.0010	
75,600	1,000	.1167		
	100		.0015	
113,400	1,500	.1880		
	100		.0046	
127,500	1,687			Ultimate strength.

Failed at knots 1¼″ diameter, 13″ and 18″ from end.

No. 583.



Sectional area, 69 square inches.
Gauged length, 100″.
Weight, 196½ pounds.
Not counterweighted.
Average rate of growth, 13 rings per inch.

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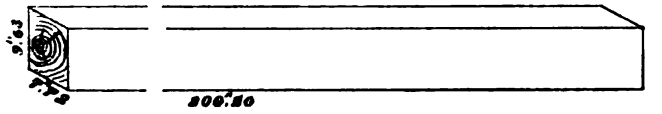
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
6,900	100	.....	.....	
34,500	500	.0298	.....	
.....	100	.....	.0010	
69,000	1,000	.0625	.....	
.....	100	.....	.0010	
103,500	1,500	.0950	.....	
.....	100	.....	.0020	
206,500	3,022	.....	.....	Ultimate strength.

Failed at a group of knots 50″ from end; largest knot, 1⅛″ diameter.

No. 590.

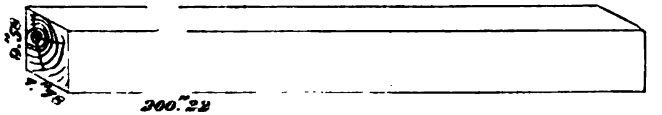


Sectional area, 74.3 square inches.
Gauged length, 150″.
Weight, 242 pounds.
Counterweight at middle, 126 pounds.
Average rate of growth, 7 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
7,430	100	0.	.....	0.	0.	
37,150	500	.0446	.....	.01	.03	
.....	100	.....	0.	0.	0.	
74,300	1,000	.1060	.....	.03	.05	
.....	100	.....	0.	0.	0.	
111,450	1,500	.1710	.....	.06	.06	
.....	100	.....	.0010	.01	.01	
148,600	2,000	.2450	.....	.10	.05	
.....	100	.....	.0040	.01	0.	
161,000	2,167	.....	.....	.28	— .05	Ultimate strength.

Failed at knots 20″ from end. Five knots at place of failure, size varying from 1″ to 1½″ diameter.

No. 591.



Sectional area, 74.5 square inches.
Gauged length, 150″.
Weight, 210½ pounds.
Counterweight at middle, 108 pounds.
Average rate of growth, 9 rings per inch.

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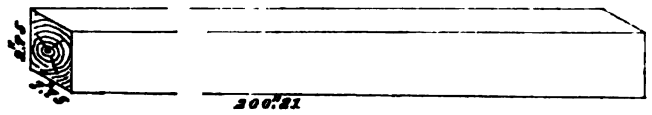
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
7,450	100	0.	.....	0.	0.	
37,250	500	.0565	.....	0.	—.01	
.....	100	.....	.0015	0.	0.	
74,500	1,000	.1275	.....	0.	—.02	
.....	100	.....	.0020	0.	0.	
111,750	1,500	.2008	.....	—.01	—.04	
.....	100	.....	.0030	0.	—.0	
149,000	2,000	.2850	.....	.06	0.	
.....	100	.....	.0094	0.	0.	
163,000	2,188	.....	.....	.35	—.30	Ultimate strength.

Failed at a group of knots near middle of post; one knot 2″ diameter.

No. 592.

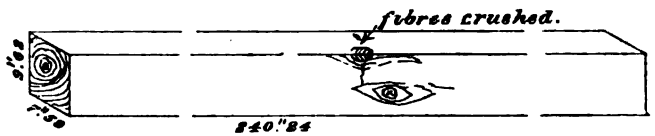


Sectional area, 75.6 square inches.
Gauged length, 150″.
Weight, 274 pounds.
Counter weight at middle, 138 pounds.
Average rate of growth, 8 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
7,560	100	0.	.....	0.	0.	This post contained 23 knots, averaging 2″ diameter.
37,800	500	.0510	.....	0.	—.04	
.....	100	.....	.0012	0.	0.	
75,600	1,000	.1123	.....	0.	—.07	
.....	100	.....	.0023	0.	0.	
113,400	1,500	.1760	.....	0.	—.10	
.....	100	.....	.0037	0.	0.	
151,200	2,000	.2476	.....	.03	—.14	
.....	100	.....	.0088	0.	0.	
175,800	2,319	.....	.....	.10	—.21	Ultimate strength.

Failed 75″ from end, at a knot 2¼″ diameter.

No. 533.



Sectional area, 73 square inches.
Gauged length, 200″.
Weight, 278 pounds.
Counterweight at middle, 138 pounds.
Post contains 30 knots, from ½″ to 1½″ diameter.

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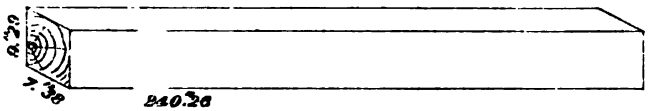
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
7,300	100	0.		0.	0.	
36,500	500	.0693		−.02	−.03	
	100		.0003	0.	0.	
73,000	1,000	.1570		−.05	−.06	
	100		.0010	0.	0.	
109,500	1,500	.2470		−.08	−.10	
	100		.0030	0.	−.01	
140,000	1,918			−1.20	−.49	Ultimate strength.

Deflected sideways. Fibers crushed at some knots at middle of post.

No. 534.

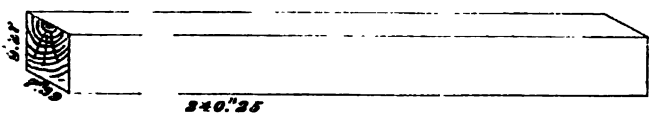


Sectional area, 68.6 square inches.
Gauged length, 200″.
Weight, 285 pounds.
Counterweight at middle, 138 pounds.
Quality of post as regards knots about the same as No. 533.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
6,850	100	0.		0.	0.	
34,300	500	.0580		.01	.07	
	100		0.	0.	0.	
68,600	1,000	.1336		0.	.15	
	100		0.	0.	.01	
80,000				−.01	.18	
90,000				−.02	.20	
100,000				−.03	.21	
110,000				−.05	.24	
120,000				−.07	.26	
130,000				−.10	.29	
140,000				−.15	.30	
150,000				−.21	.32	
160,000				−.35	.34	
166,000	2,420			−.70	.34	Ultimate strength.

Fibers crushed at knot near middle of post.

No. 535.



Sectional area, 68.5 square inches.
Gauged length, 200″.

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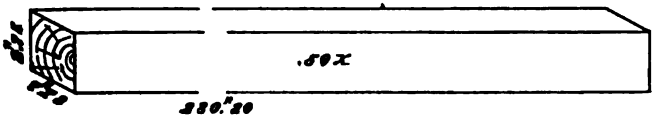
Weight, 295 pounds.
Counterweight at middle, 138 pounds.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
6,850	100	0.	.....	0.	0.	
34,250	500	.0468	.....	0.	.02	
.....	100	.....	0.	0.	0.	
68,500	1,000	.1090	.....	0.	.04	
.....	100	.....	0.	0.	0.	
102,750	1,500	.1738	.....	— .01	.04	
.....	100	.....	0.	0.	0.	
110,000	.....	.....	.....	— .03	.03	
120,000	.....	.....	.....	— .04	.04	
130,000	.....	.....	.....	— .04	.04	
140,000	.....	.....	.....	— .05	.04	
150,000	.....	.....	.....	— .06	.04	
160,000	.....	.....	.....	— .08	.04	
170,000	.....	.....	.....	— .08	.03	
180,000	.....	.....	.....	— .09	.03	
190,000	.....	.....	.....	— .10	.02	
200,000	.....	.....	.....	— .10	.01	
206,000	3,007	.....	.....	+ .10	— .04	Ultimate strength.

Failed at some knots 24″ from middle of post; maximum deflection at this point.

No. 539.



Sectional area, 75.4 square inches.
Gauged length, 200″.
Weight, 352 pounds.
Counterweight at middle, 176 pounds.
Initial bend in post before dressing down from size 8″×10″: Horizontal —″.50.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
7,540	100	0.	.....	0.	0.	
37,700	500	.0760	.....	— .04	.03	
.....	100	.....	.0006	0.	0.	
75,400	1,000	.1710	.....	— .08	.10	
.....	100	.....	.0010	0.	0.	
113,100	1,500	.2700	.....	— .21	.15	
.....	100	.....	.0025	0.	0.	
120,000	.....	.....	.....	— .26	.19	
130,000	.....	.....	.....	— .38	.20	
140,000	1,857	.....	.....	— .66	.22	Ultimate strength.

Sustained maximum load 3 minutes, horizontal deflection increasing rapidly.

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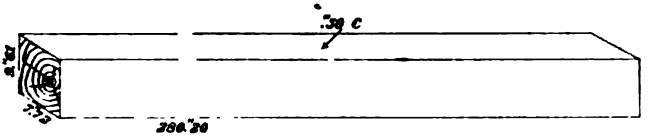
No. 540.

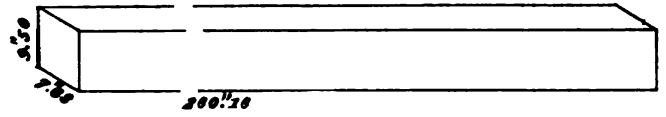


Sectional area, 74.2 square inches.
Gauged length, 200″.
Weight, 357 pounds.
Counterweight at middle, 178 pounds.
Initial deflection before dressing down from size 8″×10″: Vertical —″50.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
7,420	100	0.	.....	0.	0.	Post contains 32 knots, varying in diameter from ½″ to 1¼″.
37,160	500	.0556	.....	.03	— .02	
.....	100	.....	.0010	0.	0.	
74,200	1,000	.1240	.....	.09	— .03	
.....	100	.....	.0015	0.	0.	
111,300	1,500	.1960	.....	.17	— .03	
.....	100	.....	.0020	0.	0.	
120,000	.....	.....	.....	.17	— .03	
130,000	.....	.....	.....	.20	— .03	
140,000	.....	.....	.....	.25	— .04	
150,000	.....	.....	.....	.33	— .03	
160,000	.....	.....	.....	.44	— .02	
170,000	2,291	.....	.....	.86	+ .04	Ultimate strength.

Failed by horizontal deflection, fibers crushing at knots near the middle.

No. 541.



Sectional area, 72.5 square inches.
Gauged length, 200″.
Weight, 340 pounds.
Counterweight at middle, 170 pounds.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
7,250	100	0.	.....	0.	0.	
36,250	500	.0580	.....	0.	0.	
.....	100	.....	.0014	0.	0.	
72,500	1,000	.1360	.....	— .10	0.	
.....	100	.....	.0020	0.	0.	
108,750	1,500	.2140	.....	— .25	.04	
.....	100	.....	.0030	— .02	0.	
120,000	.....	.....	.....	— .32	.05	
130,000	.....	.....	.....	— .41	.10	
140,000	.....	.....	.....	— .61	.15	
150,000	2,069	.....	.....	—1.22	.40	Ultimate strength.

Failed by deflecting diagonally sideways and upward.

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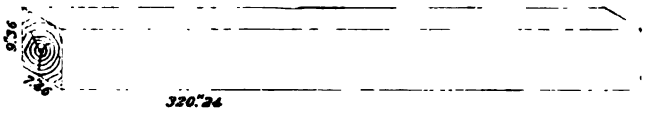
No. 536.

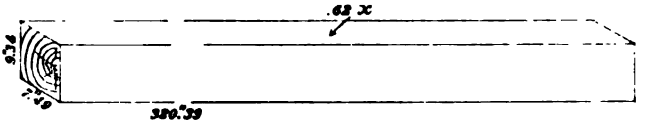


Sectional area, 69.8 square inches.
Gauged length, 300″.
Weight, 427 pounds.
Counterweight at middle, 214 pounds.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
6,980	100	0.	.....	0.	0.	
34,900	500	.0745	.....	0.	.03	
.....	100	.....	0.	0.	0.	
69,800	1,000	.1992	.....	0.	.08	
.....	100	.....	.0005	0.	0.	
104,700	1,500	.2705	.....	.03	.11	
.....	100	.....	.0017	0.	0.	
110,000	.....	.....	.....	.01	.13	
120,000	.....	.....	.....	.01	.15	
130,000	.....	.....	.....	.03	.16	
140,000	.....	.....	.....	.06	.19	
150,000	.....	.....	.....	.10	.21	
160,000	.....	.....	.....	.20	.23	
169,000	2,421	.....	.....	1.00	.15	Ultimate strength.

Failed by deflection sideways, crushing fibers at two places near middle of post at knots.

No. 537.



Sectional area, 70 square inches.
Gauged length, 300″.
Weight, 397 pounds.
Counterweight at middle, 200 pounds.
Initial bend in post before dressing down from size 8″×10″: Vertical, +″.62.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
7,000	100	0.	.....	0.	0.	
35,000	500	.0930	.....	—.02	—.07	
.....	100	.....	.0024	0.	0.	
70,000	1,000	.2025	.....	—.10	—.09	
.....	100	.....	.0030	—.01	0.	
105,000	1,500	.3144	.....	—.22	—.10	
.....	100	.....	.0044	—.02	0.	
110,000	.....	.....	.....	—.27	—.10	
120,000	.....	.....	.....	—.34	—.10	
130,000	.....	.....	.....	—.46	—.10	
140,000	2,000	.....	.....	—.70	—.10	Ultimate strength.

Deflected sideways, taking a sharp bend at middle at some knots.

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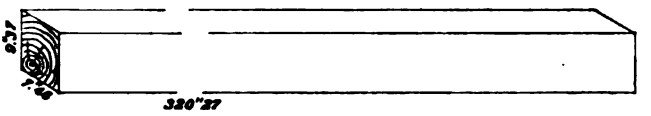
No. 538.

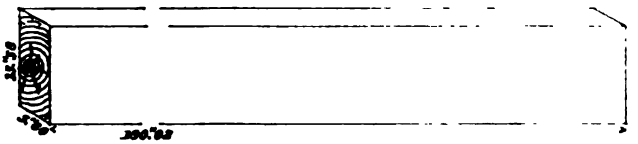


Sectional area, 69.9 square inches.
Gauged length, 300″.
Weight, 384 pounds.
Counterweight at middle, 200 pounds.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
6,990	100	0.	.....	0.	0.	
34,950	500	.0942	.....	0.	—.04	
.....	100	.....	.0017	0.	0.	
69,900	1,000	.2150	.....	.03	—.12	
.....	100	.....	—.0042	0.	0.	
104,850	1,500	.3444	.....	.15	—.22	
.....	100	.....	.0095	0.	—.01	
110,000	.....	.....	.....	.18	—.25	
120,000	.....	.....	.....	.30	—.30	
130,000	.....	.....	.....	.72	—.42	
134,000	1,917	.....	.....	1.67	—.60	Ultimate strength.

Deflected sideways and downward, crushing the fibers on concave side at knots.

No. 702.



Sectional area, 87.2 square inches.
Gauged length, 150″.
Weight, 300 pounds.
Average weight of growth, 10 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical, W.	Deflections. Vertical, E.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*		
0	0	0.		0.	0.	0.	
43,600	500	.0700	0.	.01	—.03	.....	
.....	0	.....	.....	.....	.....	.....	
60,000	.....	.....	.0005	.01	—.03	.....	
80,000	.....	.....	.....	0.	—.04	.....	
100,000	.....	.....	.....	0.	—.04	.01	
120,000	.....	.....	.....	—.02	—.04	.....	
140,000	.....	.....	.....	—.10	—.05	.....	
150,000	.....	.....	.....	—.20	—.06	.10	
152,000	1,823	.....	.....	—.37	—.10	.....	Ultimate strength.

NOTE.—The letters W and E are used to indicate that vertical deflections were taken on the west and east side of machine. The measurements show an apparent vertical movement, plus on one side and minus on the other, as the stick twisted during the test.

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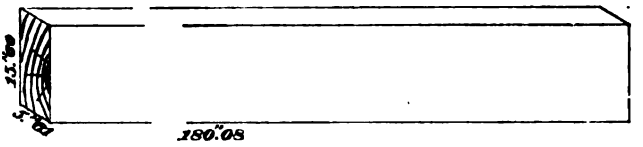
Fibers crushed 23″ from end at a group of knots.

No. 703.

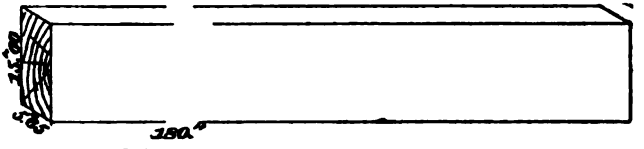


Sectional area, 87.5 square inches.
Gauged length, 150″.
Weight, 267 pounds.
Average rate of growth, 5 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical, W.	Deflections. Vertical, E.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.		0.	0.	0.	
43,750	500	.0760		.07	.06	— .05	
	0		.0007				
60,000				.04	.07		
80,000				.02	.09		
100,000				0.	.10	0.	
120,000				— .03	.10		
140,000				— .08	.10		
155,000				— .15	.10		
160,000				— .20	.10		
168,500	1,926			— .51	.12		Ultimate strength.

Failed by horizontal deflection, minus direction; took maximum deflection at a group of knots about 12″ from middle of stick.

No. 704.



Sectional area, 88.1 square inches.
Gauged length, 150″.
Weight, 267 pounds.
Average rate of growth, 12 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical, W.	Deflections. Vertical, E.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.		0.	0.	0.	
44,050	500	.0653		0.	0.	0.	
	0		.0003				
60,000				— .01	0.		
80,000				— .07	— .01		
100,000				— .11	— .02		
120,000				— .20	— .03		
140,000				— .31	— .03		
150,000				— .40	— .05	0.	
160,000				— .55	— .06		
165,000	1,873			— .83	— .10		Ultimate strength.

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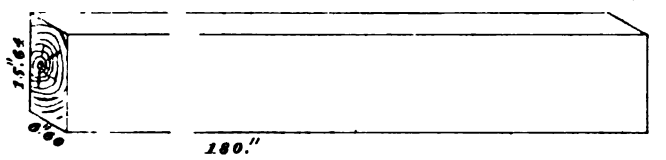
Failed by horizontal deflection, minus direction; fibers crushed about 12″ from south end at a group of knots.

No. 699.

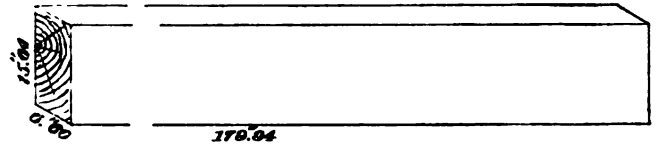


Sectional area, 103.2 square inches.
Weight, 356 pounds.
Gauged length, 150″.
Average rate of growth, 7 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical, W.	Deflections. Vertical, E.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.	0.	0.	0.	0.	
51,600	500	.0435		0.	.05	.02	
0	0		0.				
80,000				.01	.06		
100,000				.01	.07	.02	
120,000				.02	.08		
140,000				.02	.09		
160,000				.02	.10		
180,000				.02	.10		
200,000				.02	.10	0.	
220,000				.02	.11		
230,000				.02	.11		
240,000	2,326			.03	.11		Ultimate strength.

Failed by crushing fibres at a group of knots 40″ from end.

No. 700.



Sectional area, 103.2 square inches.
Gauged length, 150″.
Weight, 395 pounds.
Average rate of growth, 10 rings per inch.

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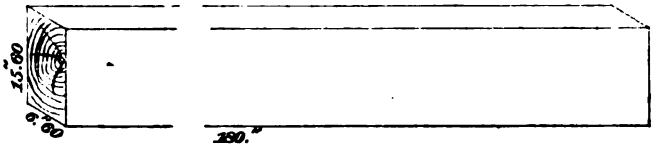
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.			Remarks.
				Horizontal.	Vertical, W.	Vertical, E.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.		0.	0.	0.	
51,600	500	.0475		.05	.06	0.	
	0	.0	.0				
80,000				.08	.07		
100,000				.09	.08	— .02	
120,000				.11	.09		
140,000				.12	.10		
160,000				.15	.12		
180,000				.18	.13		
200,000				.21	.16	— .15	
220,000				.26	.20		
230,000				.31	.21	— .20	
239,009	2,316			.40	.28		Ultimate strength.

Stick failed at knots 10″ and 60″ from north end; opened oblique longitudinal crack between the above groups of knots.

No. 701.

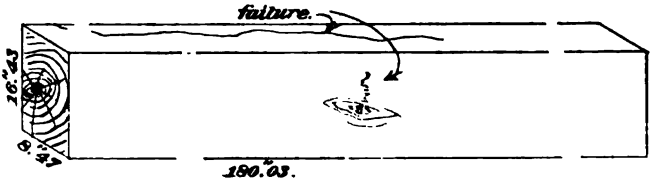


Sectional area, 103 square inches.
Gauged length, 150″.
Weight, 376 pounds.
Average rate of growth, 7 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.			Remarks.
				Horizontal.	Vertical, W.	Vertical, E.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.		0.	0.	0.	
51,500	500	.0519		.03	.04	.02	
	0		.0				
80,000				.03	.05		
100,000				.03	.05		
120,000				.02	.05		
140,000				.02	.06		
160,000				.02	.06		
180,000				.02	.06		
200,000				.05	.05		
203,000	1,971						Ultimate strength.

Failed at a group of knots 15″ from middle of post.

No. 705.



Sectional area, 139.2 square inches.
Gauged length, 150″.

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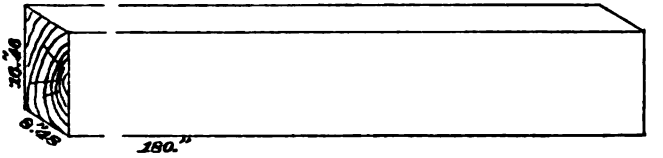
Weight, 657 pounds.
Average rate of growth, 6 rings per inch.
Stick in wet condition.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.			Remarks.
				Horizontal.	Vertical, W.	Vertical, E.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.	.....	0.	0.	0.	
69, 600	500	.0508	.....	— .10	.02	.....	
.....	0	.....	.0005	.....	.....	.....	
80, 000	.....	.....	.....	— .10	.03	.....	
100, 000	.....	.....	.....	— .10	.03	.02	
140, 000	.....	.....	.....	— .10	.05	.....	
180, 000	.....	.....	.....	— .10	.06	.....	
200, 000	.....	.....	.....	— .11	.05	.....	
220, 000	.....	.....	.....	— .13	.05	.....	
230, 000	.....	.....	.....	— .15	.04	.....	
240, 000	.....	.....	.....	— .16	.03	.....	
250, 000	.....	.....	.....	— .19	.02	.....	
260, 000	.....	.....	.....	— .20	.02	.....	
270, 000	.....	.....	.....	— .25	— .02	.10	
279, 400	2, 007	.....	.....	— .35	— .09	.....	Ultimate strength.

Failed by crushing fibers in vicinity of knot at middle of stick; also, opened oblique longitudinal crack.

No. 706.



Sectional area, 139.6 square inches.
Ganged length, 150″.
Weight, 437 pounds.
Average rate of growth, 5 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.			Remarks.
				Horizontal.	Vertical, W.	Vertical, E.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.	.....	0.	0.	0.	
69, 800	500	.0590	.....	.02	.08	—.05	
.....	0	.....	0.	.....	.....	.....	
100, 000	.....	.....	.....	.03	.10	.....	
140, 000	.....	.....	.....	.03	.13	.....	
180, 000	.....	.....	.....	.03	.19	.....	
200, 000	.....	.....	.....	.03	.20	—.10	
220, 000	.....	.....	.....	.03	.22	.....	
240, 000	.....	.....	.....	.03	.25	.....	
260, 000	.....	.....	.....	.03	.30	—.15	
280, 000	.....	.....	.....	0.	.37	.....	
292, 000	2, 092	.....	.....	—.10	.45	.....	Ultimate strength.

Failed at a group of knots at middle of stick, and at knots 29″ from north end.

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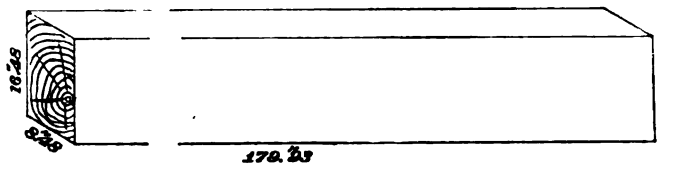
No. 707.



Sectional area, 139.8 inches.
Gauged length, 150″.
Weight, 447 pounds.
Average rate of growth, 5 rings per inch.

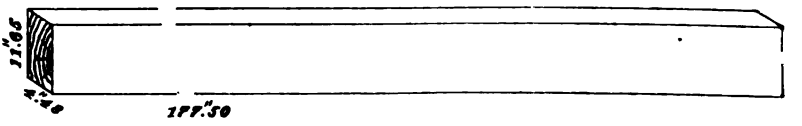
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical, W.	Deflections. Vertical, E.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0		0.	0.	0.	0.	
69,900	500	.0305		— .06	.10	.05	
	0		—.0005				
100,000				— .07	.11		
140,000				— .08	.13		
180,000				— .09	.16		
200,000				— .10	.18	.05	
220,000				— .10	.19		
240,000				— .10	.20		
260,000				— .10	.21		
280,000				— .12	.25		
290,000				— .13	.26		
300,000				— .13	.27		
320,000				— .15	.30		
340,000				— .18	.32		
350,000				— .22	.40	— .15	
359,000	2,568						Ultimate strength.

Failed by horizontal deflection, minus direction. Fibers crushed at north end, where the wood was imperfect, giving direction to the final deflection.

COMPRESSION TESTS OF WHITE PINE—(Continued.)

Single sticks and built posts.

No. 664.



Sectional area, 52.2 square inches.
Gauged length, 150″.
Weight, 153 pounds.
Average rate of growth, 11 rings per inch.

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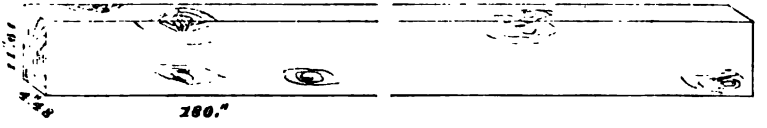
Loads applied.	Pounds per square inch.	Compression.	Compression set.	Deflections. Horizontal.	Deflections. Vertical, W.	Deflections. Vertical, E.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.	0.	— .23	0.	0.	
26,100	500	.0545	.....	0.	.02	.....	
0	0	.....	.0004	— .21	0.	.....	
40,000	.....	.....	.....	+ .02	.04	— .06	
60,000	.....	.....	.....	0.	.07	.....	
80,000	.....	.....	.....	— .06	.07	.....	
100,000	.....	.....	.....	— .20	.07	— .08	
110,000	2,107	.....	.....	— .43	.10	.....	Ultimate strength.

Failed by horizontal deflection in minus direction.

Deflection increased to —2″.30 fibers of stick, crushing 15″ from middle, 2″ from north end, and 8″ from south end, in the vicinity of knots.

No. 665.



Sectional area, 52.1 square inches.

Weight, 143 pounds.

Gauged length, 150″.

Average rate of growth, 10 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Compression set.	Deflections. Horizontal.	Deflections. Vertical, W.	Deflections. Vertical, E.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.	0.	— .07	0.	0.	
26,050	500	.1010	.....	+ .02	.....	.....	
0	0	.....	.0010	— .07	.....	.....	
30,000	.....	.....	.....	+ .02	— .09	— .06	
40,000	.....	.....	.....	+ .02	— .09	.....	
50,000	.....	.....	.....	.04	— .09	.....	
60,000	.....	.....	.....	.10	— .09	.....	
70,000	.....	.....	.....	.15	— .08	.....	
80,000	.....	.....	.....	.40	— .06	.....	
81,500	1,564	.....	.....	1.15	.....	.....	Ultimate strength.

Failed by horizontal deflection, plus direction.

Sprung sideways suddenly after passing the maximum load. Rotating around vertical edges of ends similar to a post with pin ends. Fibers not crushed.

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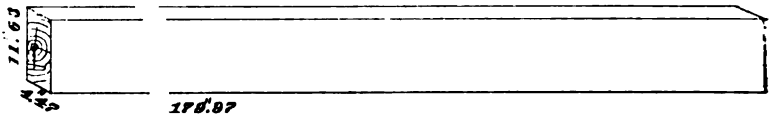
No. 666.

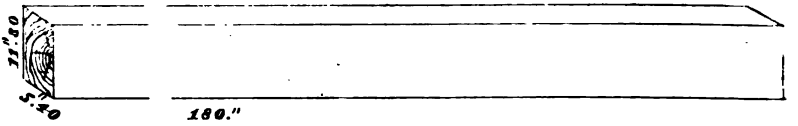


Sectional area, 52 square inches.
Gauged length, 150″.
Weight, 163 pounds.
Average rate of growth, 5 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Compression set.	Deflections. Horizontal.	Deflections. Vertical, W.	Deflections. Vertical, E.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.	.....	0.	0.	0.	
26,000	500	.0895	.....	.07	— .10	0.	
0	0	.....	.0004	.....	.....	.....	
30,000	.....	.....	.....	.09	— .10	.....	
40,000	.....	.....	.....	.11	— .12	.....	
50,000	.....	.....	.....	.16	— .13	.....	
60,000	.....	.....	.....	.28	— .13	.....	
70,000	1,346	.....	.....	1.25	.....	.....	Ultimate strength.

Failed by horizontal deflection, plus direction.
When the horizontal deflection reached 3″ the post sprung suddenly sideways, rotating around vertical edges of ends.

No. 667.



Sectional area, 61 square inches.
Gauged length, 150″.
Weight, 228 pounds.
Average rate of growth, 13 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Compression set.	Deflections. Horizontal.	Deflections. Vertical, W.	Deflections. Vertical, E.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.	.....	.....	.....	.....	
30,500	500	.0505	.....	— .03	.04	— .04	
0	0	.....	0.	.....	.....	.....	
50,000	.....	.....	.....	— .05	.08	.....	
60,000	.....	.....	.....	— .07	.09	.....	
70,000	.....	.....	.....	— .08	.10	— .10	
80,000	.....	.....	.....	— .09	.10	.....	
90,000	.....	.....	.....	— .10	+ .11	.....	
100,000	.....	.....	.....	— .13	.12	— .15	
110,000	.....	.....	.....	— .15	.15	.....	
120,000	.....	.....	.....	— .19	.16	.....	
130,000	.....	.....	.....	— .22	.17	.....	
140,000	.....	.....	.....	— .30	.18	.....	
150,000	.....	.....	.....	— .37	.20	— .22	
160,000	2,623	.....	.....	— .60	.20	.....	Ultimate strength.

Failed by horizontal deflection, minus direction.
Loads continued gradually increasing the deflection to 3″, fibers of the stick crushing at the middle and 3½″ to 4½″ from ends.

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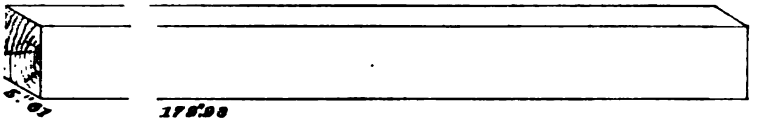
No. 668.

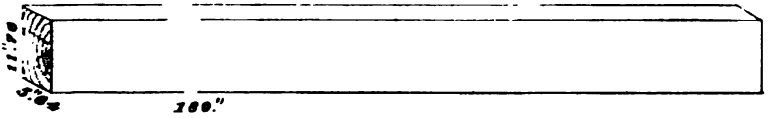


Sectional area, 65.8 square inches.
Gauged length, 150″.
Weight, 193 pounds.
Average rate of growth, 5 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Compression set.	Deflections. Horizontal.	Deflections. Vertical, W.	Deflections. Vertical, E.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.		0.	0.	0.	
32,900	500	.0622		— .05	— .03		
	0		.0004				
50,000				— .08	— .04		
70,000				— .10	— .05		
90,000				— .14	— .05		
100,000				— .16	— .06	.09	
110,000				— .19	— .07		
120,000				— .21	— .07		
130,000				— .26	— .09		
140,000				— .32	— .10		
150,000				— .40	— .10	.18	
156,300	2,375			— .60	— .15		Ultimate strength.

Failed by horizontal deflection, minus direction.
Deflections increased to 3″. Fibers crushed at a group of knots 30″ from middle, where maximum deflection occurred. Fibers also crushed at some knots 3″ to 6″ from north end.

No. 669.



Sectional area, 66.3 square inches.
Gauged length, 150″.
Weight, 253 pounds.
Average rate of growth, 5 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Compression set.	Deflections. Horizontal.	Deflections. Vertical, W.	Deflections. Vertical, E.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0		0.	0.	0.	
33,150	500	.0608		0.	— .01		
	0		0004				
50,000					— .02	.02	
70,000				.01	— .05		
90,000				.04	— .07	.03	
100,000				.05	— .08		
110,000				.07	— .09		
120,000				.10	— .10		
130,000				.13	— .10		
140,000				.18	— .10		
150,000				.34	— .10	.01	
152,300	2,297			.60			Ultimate strength.

Failed by horizontal deflection, plus direction.
Fibers crushed at middle, in the vicinity of some knots.

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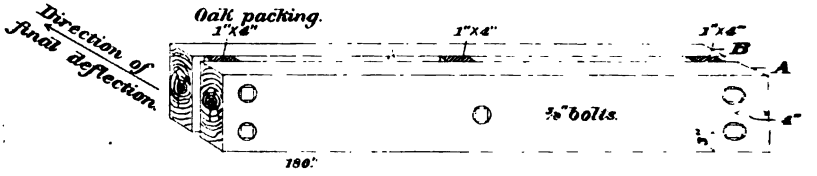
No. 638.



Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	181	6	180	4.50	11.60	52.2	150
B	134	8	180	4.50	11.59	52.2	150
	315	.....	.....	.....	.....	104.4	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.
	Actual.	Pounds per sq. inch.			
	Pounds.		*Inch.*	*Inch.*	*Inch.*
A	26,100	500	.0670	(?)	+ .02
B	26,100	500	.0750	.0002	— .06

Test of built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	.....	
20,000	0.	0.	.....	
40,000	— .01	.02	.....	
60,000	— .01	.02	.....	
80,000	— .02	.02	.....	
100,000	— .03	.02	.....	
120,000	— .03	.02	.....	
140,000	— .04	.02	.....	
160,000	— .05	0.	.....	
180,000	— .05	0.	.....	
200,000	0.	—.01	.....	Ultimate strength = 1,916 pounds per square inch.

Failed by deflecting horizontally in plus direction. Post changed its direction of bending horizontally at 180,000 pounds.

When the load reached 200,000 pounds, measurement showed zero horizontal deflection. It now took a plus direction, which was increased to +1″.50, when the loads were released.

Under the maximum deflection, fibers of stick B crushed at some knots 15″ from middle.

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No. 639.

Same style of post as No. 638.

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	182	7	180	4.52	11.66	52.7	150
B	167	5	180	4.49	11.62	52.2	150
	349	.....	.....	.....	.....	104.9	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.
	Actual.	Pounds per sq. inch.			
	Pounds.		*Inch.*	*Inch.*	*Inch.*
A	26,350	500	.0645	.0002	— .03
B	26,100	500	.0670	.0004	— .02

Test of built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	.....	
20,000	0.	0.	.....	
40,000	0.	0.	.....	
60,000	0.	0.	.....	
80,000	0.	0.	.....	
100,000	0.	0.	.....	
120,000	0.	0.	.....	
140,000	0.	0.	.....	
160,000	0.	0.	.....	
180,000	— .02	0.	.....	
200,000	— .08	0.	.....	
212,000	— .45	.....	.....	Ultimate strength = 2,021 pounds per square inch.

Failed by horizontal deflection in minus direction. Crushed fibers of stick B at middle.

The deflections increase rapidly soon after the first indications of final failure appear.

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No. 640.

Same style of post as No. 638.

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	131	7	180	4.53	11.59	5.25	150
B	158	5	180	4.52	11.59	5.25	150
	289	.....	.....	.....	.....	10.50	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.
	Actual.	Pounds per sq. inch.			
	Pounds.		*Inch.*	*Inch.*	*Inch.*
A	26,250	500	.1060	.0015	+ .05
B	26,250	500	.0955	.0010	− .10

Test of built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	.....	
20,000	0.	0.	.....	
40,000	− .02	0.	.....	
60,000	− .02	0.	.....	
80,000	− .02	0.	.....	
100,000	0.	0.	.....	
120,000	.01	0.	.....	
140,000	.18	0.	.....	
149,000	1.20	0.	.....	Ultimate strength = 1,419 pounds per square inch.

Failed by horizontal deflection in plus direction.
Deflections increased rapidly when the maximum load was approached

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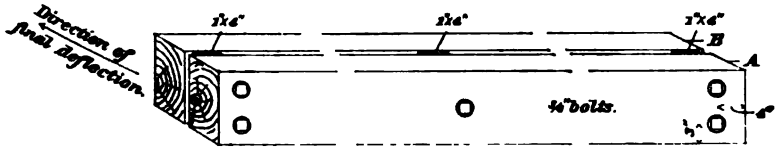
No. 642.



Preliminary test of single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	192	6	179.98	5.57	11.61	64.7	150
B	306	7	179.98	5.58	11.61	64.7	150
						129.4	

Stick.	Loads applied. Actual.	Loads applied. Pounds per square inch.	Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	32,350	500	.0770	.0006	.07	0.
B	32,350	500	.0390	— .0007	.08	.05

Test of built post.

Loads applied.	Deflections. Horizontal.	Vertical, W.	Vertical, E.	Remarks.
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.		
20,000	0.	0.		
40,000	0.	0.		
60,000	0.	.01		
80,000	0.	.02		
100,000	0.	.03		
120,000	.01	.04		
140,000	.03	.04		
150,000	.04	.04		
160,000	.06	.04		
170,000	.08	.04		
180,000	.10	.04		
190,000	.11	.02		
200,000	.18	.01		
210,000	.32	0.		
215,000	.72	— .03		Ultimate strength.

Failed by horizontal deflection in plus direction.

Deflections continued to 1″.15 horizontal, the fibers of stick A crushing in the vicinity of knots 16″ and 48″ from end.

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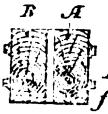
643.

Same style of post as No. 642.



Preliminary test of the single sticks.

Stick.	Weight	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	203	17	179.92	5.65	11.61	65.6	150
B	189	5	179.92	5.61	11.62	65.2	150
	392	.....	.....	.....	.....	130.8	.....

Stick.	Loads applied. Actual.	Loads applied. Pounds per square inch.	Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	32,800	500	.0440	0.	.02	— .01
B	32,800	500	.0600	.0008	— .02	— .02

Test of built post.

Loads applied.	Deflections. Horizontal.	Deflections. Vertical, W.	Deflections. Vertical, E.	Remarks.
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	.0	0.	.....	
20,000	.0	0.	.....	
40,000	— .01	.05	.....	
60,000	— .01	.08	.....	
80,000	— .01	.10	.....	
100,000	— .01	.12	.....	
120,000	— .01	.12	.....	
140,000	— .02	.13	.....	
160,000	— .02	.14	.....	
180,000	— .02	.16	.....	
200,000	— .05	.18	.....	
220,000	— .07	.20	.....	
230,000	— .09	.21	.....	
240,000	— .10	.22	.....	
250,000	— .15	.25	.....	
255,000	— .19	.25	.....	
260,000	— .29	.29	.....	
261,000	— .45	.30	.....	Ultimate strength = 1,995 lbs. per square inch.

Failed by deflecting horizontally in minus direction and upward. The deflection was increased horizontally to 1″.20 with changing the vertical.

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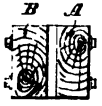
No. 644.

Same style of post as No. 642.



Preliminary test of single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	227	7	179.96	5.60	11.63	65.1	150
B	236	7	179.96	5.60	11.62	65.1	150
	463	.....	.....	.....	.....	130.2	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per sq. inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	32,550	500	.0596	0.	— .02	— .02
B	32,550	500	.0690	.0005	.02	— .01

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	.....	
20,000	0.	0.	.....	
40,000	0.	.02	.....	
60,000	0.	.03	.....	
80,000	— .01	.05	.....	
100,000	— .01	.06	.....	
120,000	— .01	.06	.....	
140,000	— .01	.09	.....	
160,000	— .03	.10	.....	
180,000	— .04	.10	.....	
200,000	— .06	.11	.....	
210,000	— .08	.11	.....	
220,000	— .09	.12	.....	
230,000	— .10	.13	.....	
240,000	— .11	.13	.....	
250,000	— .15	.14	.....	
255,000	— .20	.13	.....	
257,800	— .45	.05	.....	Ultimate strength = 1,980 pounds per square inch.

Failed by horizontal deflection in minus direction. Crushed fibers of stick A 12″ from end, and stick B at middle.

The fibers crushing in each case in the vicinity of knots.

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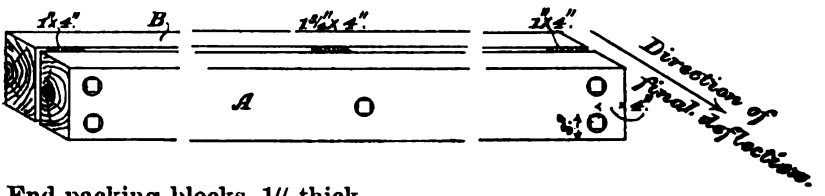
No. 648.

Swelled white-pine built post.



End packing blocks, 1″ thick.
Middle packing block, 1¾″ thick.

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches*	*Inches.*
A	206	12	180	5.60	11.72	65.6	150
B	203	10	180	5.61	11.72	65.6	150
	409	.....	.....	.....	.....	131.2	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per sq. inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	32,800	500	.0590	.0002	.19	.04
B	32,800	500	.0700	0.	.05	.02

Transversely stick A is the stiffer of the two. When the post is bolted up, A deflects ".34; B deflects ".41.

Test of built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	.....	
20,000	0.	0.	.....	
40,000	0.	0.	.....	
60,000	—.01	0.	.....	
80,000	—.02	0.	.....	
100,000	—.05	0.	.....	
120,000	—.07	0.	.....	
140,000	—.08	0.	.....	
160,000	—.10	0.	.....	
180,000	—.13	—.02	.....	
200,000	—.17	—.04	.....	
210,000	—.19	—.06	.....	
220,000	—.21	—.06	.....	
230,000	—.23	—.08	.....	
240,000	—.23	—.10	.....	
250,000	—.19	—.18	.....	
260,000	—.07	—.25	.....	
268,000	.....	.....	.....	Ultimate strength.

Stick B failed. Fibers crushed at a group of 5 knots 14″ from middle. Size of largest knot, 1½″ diameter.

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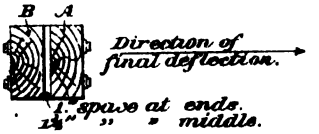
No. 649.

Same style of post as No. 648.



Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	187	9	180	5.60	11.71	65.6	150
B	184	4	180	5.61	11.74	65.9	150
	371	.....	.....	.....	.....	131.5	.....

Stick.	Loads applied. Actual.	Pounds per sq. inch.	Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch*
A	32,800	500	.0600	.0002	— .19	— .03
B	32,950	500	.0705	.0008	.34	.05

Test of the built post.

Transversely when the post is bolted up.
Stick A deflects ".39." Middle bolt has washers 4" diameter.
Stick B deflects ".36."

Loads applied.	Deflections. Horizontal.	Vertical, W.	Vertical, E.	Remarks.
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	.....	
20,000	0.	0.	.....	
40,000	.01	.01	.....	
60,000	.02	.02	.....	
80,000	.02	.02	.....	
100,000	.02	.05	.....	
120,000	.02	.08	.....	
140,000	.02	.09	.....	
160,000	.02	.10	.....	
180,000	0.	.11	.....	
200,000	0.	.12	.....	
210,000	— .01	.14	.....	
220,000	— .02	.15	.....	
230,000	— .02	.16	.....	
240,000	— .05	.18	.....	
250,000	— .06	.18	.....	
260,000	— .10	.20	.....	
265,000	— .15	.21	.....	
270,000	— .25	.22	.....	
275,000	— .38	.24	.....	
277,000	Ab't — .80	.24	.....	Ultimate strength = 2,107 pounds per square inch.

Failed by horizontal deflection, minus direction.
Fibers of stick A crushed at middle of post.

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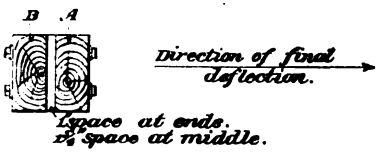
No. 650.

Same style of post as No. 648.



Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Ganged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq inches.*	*Inches.*
A	194	12	180	5.61	11.75	65.9	150
B	190	9	180	5.61	11.71	65.7	150
	384	.....	.....	.....	.....	131.6	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	32,950	500	.0530	0.	−.22	−.04
B	32,850	500	.0885	.0008	.17	.04

When bolted together stick A deflected ".32.
When bolted together stick B deflected ".43.

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	.....	
20,000	0.	0.	.....	
40,000	−.01	.01	.....	
60,000	−.04	.02	.....	
80,000	−.05	.04	.....	
100,000	−.06	.04	.....	
120,000	−.07	.05	.....	Post rotated over half revolution.
10,000	−.01	0.	.....	
50,000	+.02	+.01	.....	
100,000	+.06	+.05	.....	
120,000	+.08	+.05	.....	
140,000	+.09	+.06	.....	
160,000	+.10	+.06	.....	
180,000	+.12	+.07	.....	
200,000	+.15	+.09	.....	
210,000	+.20	+.10	.....	
220,000	+.21	+.10	.....	
230,000	+.26	+.10	.....	
240,000	+.31	+.10	.....	Ultimate strength = 1,824 pounds per square inch.

Failed by horizontal deflection, stick B being on the concave side.
Fibers of each stick crushed at middle in the vicinity of some knots.

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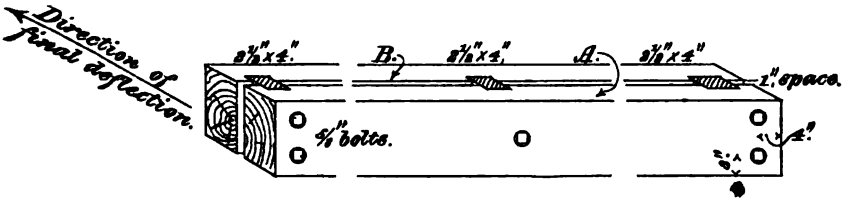
No. 645.



Oak packings let into each stick ¾".

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	215	5	179.97	5.59	11.59	64.8	150
B	266	7	179.97	5.60	11.60	65.0	150
	481	.....	.....	.....	.....	129.8	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	32,400	500	.0560	.0006	−.02	0.
B	32,500	500	.0540	0.	.02	0.

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	.....	
20,000	0.	0.	.....	
40,000	0.	.01	.....	
60,000	0.	.02	.....	
80,000	0.	.02	.....	
100,000	0.	.02	.....	
120,000	0.	.01	.....	
140,000	0.	.01	.....	
160,000	0.	.01	.....	
180,000	0.	0.	.....	
200,000	.01	.01	.....	
210,000	.01	.01	.....	
220,000	.01	.01	.....	
230,000	.01	.01	.....	
240,000	.02	.01	.....	
250,000	.05	.01	.....	
260,000	.10	.01	.....	
263,200	.30	.01	.....	Ultimate strength = 2,028 pounds per square inch.

Failed by horizontal deflection in plus direction.

Fibers of both sticks crushed at middle, where bolt passes through, and where the sticks are further weakened by cutting away ¾" of wood to receive packing block.

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No. 646.

Same style of post as No. 645.

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	206	6	180	5.59	11.61	64.9	150
B	204	12	180	5.60	11.62	65.1	150
	410	.....	.....	.....	.....	130.0	.....

Stick.	Loads applied. Actual.	Loads applied. Pounds per square inch.	Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	32,450	500	.0493	0.	0.	— .01
B	32,550	500	.0620	.0005	— .02	— .01

Test of the built post.

Loads applied.	Deflections. Horizontal.	Deflections. Vertical, W.	Deflections. Vertical, E.	Remarks.
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	.....	
20,000	0.	.02	.....	
40,000	0.	.05	.....	
60,000	0.	.06	.....	
80,000	0.	.07	.....	
100,000	0.	.07	.....	
120,000	0.	.07	.....	
140,000	0.	.08	.....	
160,000	— .01	.08	.....	
180,000	— .02	.08	.....	
200,000	— .03	.08	.....	
210,000	— .05	.08	.....	
220,000	— .07	.08	.....	
230,000	— .11	.08	.....	
240,000	— .20	.07	.....	
249,000	— .42	.02	.....	Ultimate strength = 1,915 lbs. per square inch.

Failed by horizontal deflection in minus direction.

The post took a sharp bend at the middle, crushing the fibers of stick B, and splitting stick A at the middle packing block.

Stick A crushed the fibers 10″ from end in the vicinity of knots.

During the preliminary test of the single sticks an end section (2″ × 11″.61) beyond the notched recess for packing block was accidentally split off. This piece was nailed on again. It passed through the test without disturbance, showing that it carried very little shearing load when tested in this manner between flat rigid platforms.

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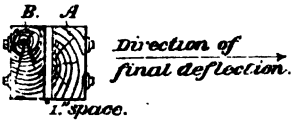
No. 647.

Same style of post as No. 645.



Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	192	11	180	5.62	11.62	65.3	150
B	192	13	180	5.62	11.62	65.3	150
	384	.....	.....	.....	.....	130.6	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	32,650	500	.0630	.0006	0.	—.01
B	32,650	500	.0700	.0005	.03	0.

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	.....	
20,000	0.	0.	.....	
40,000	0.	0.	.....	
60,000	0.	0.	.....	
80,000	—.02	.01	.....	
100,000	—.05	.01	.....	
120,000	—.06	.02	.....	
140,000	—.07	.03	.....	
160,000	—.10	.05	.....	
180,000	—.11	.06	.....	
200,000	—.15	.08	.....	
210,000	—.19	.10	.....	
220,000	—.20	.10	.....	
230,000	—.26	.11	.....	
240,000	—.35	.12	.....	
248,000	—.72	.15	.....	Ultimate strength = 1,899 pounds per square inch.

Failed by horizontal deflection in minus direction.
Stick A split fibers at middle.

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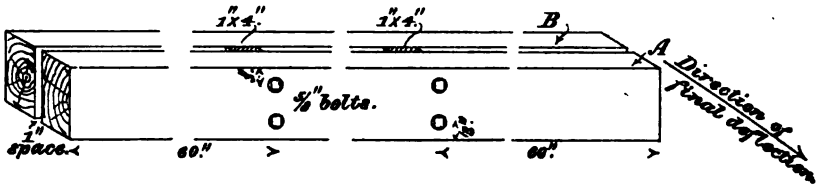
No. 678.



Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	251	16	179.94	5.58	11.47	64.0	150
B	215	8	179.94	5.57	11.45	63.8	150
	466	.....	.....	.....	.....	127.8	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	32,000	500	.0529	0.	0.	0.
B	31,900	500	.0642	.0005	—.07	.01

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	0.	
20,000	0.	—.01	.....	
40,000	—.01	—.02	.....	
60,000	—.03	—.03	.....	
80,000	—.05	—.04	.....	
100,000	—.06	—.05	.05	
120,000	—.07	—.05	.....	
140,000	—.09	—.06	.....	
160,000	—.10	—.07	.....	
180,000	—.13	—.08	.....	
200,000	—.16	—.09	.10	
220,000	—.21	—.10	.....	
230,000	—.27	—.10	.....	
240,000	—.36	—.11	.....	
245,500	—.57	—.14	.....	Ultimate strength = 1,921 pounds per square inch.

Failed by horizontal deflection, minus direction.

Fibers crushed near the south end of post at some knots.

Stick A fa led 8″ from end, stick B 2″ from end and at bolt-holes, which were bored alongside a knot.

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No. 679.

Same style of post as No. 678.

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	209	12	180	5.62	11.76	66.1	150
B	190	7	180	5.62	11.72	65.9	150
	399	.....	.....	.....	.....	132.0	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	32,050	500	.0664	.0010	.05	0.
B	32,950	500	.0705	.0003	— .05	— .01

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	0.	
20,000	0.	0.	.....	
40,000	0.	0.	.....	
60,000	0.	0.	.....	
80,000	0.	.01	.....	
100,000	0.	.01	.04	
120,000	0.	.02	.....	
140,000	0.	.04	.....	
160,000	0.	.05	.....	
180,000	0.	.05	.....	
200,000	0.	.06	.10	
210,000	.01	.07	.....	
220,000	.01	.07	.....	
230,000	.02	.08	.....	
240,000	.02	.08	.....	
249,000	.05	.08	.....	Ultimate strength = 1,886 lbs. per square inch.

Stick A failed at bolt-holes. Stick B failed at bolt-holes and at a group of knots 12″ from bolt-holes.

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No. 680.

Same style of post as No. 678.

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	268	8	180	5.60	11.72	65.6	150
B	278	8	180	5.61	11.78	65.8	150
	546	.....	.....	.....	.....	131.4	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	32,800	500	.0650	.0009	—.08	0.
B	32,900	500	.0495	0.	0.	—.02

Test of the built post.

Loads applied.	Deflection.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	0.	
20,000	0.	0.	.....	
40,000	0.	0.	.....	
60,000	0.	0.	.....	
80,000	0.	0.	.....	
100,000	0.	0.	0.	
120,000	0.	0.	.....	
140,000	0.	0.	.....	
160,000	0.	0.	.....	
180,000	0.	0.	.....	
200,000	0.	0.	.05	
210,000	0.	0.	.....	
220,000	0.	0.	.....	
230,000	0.	0.	.....	
240,000	0.	0.	.....	
250,000	0.	0.	.....	
260,000	—.01	0.	.....	
270,000	—.02	0.	.....	
278,000	.....	.....	.....	Ultimate strength = 2,116 lbs. per square inch.

Stick A failed at knots 40″ and 66″ from end. Stick B failed at knots 12″ from middle.

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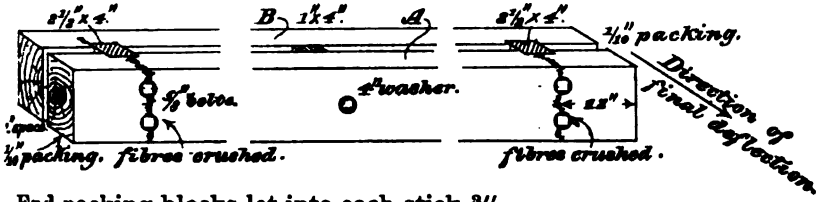
No. 663.



End packing blocks let into each stick ¾".

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	230	14	180	5.60	11.75	65.8	150
B	208	6	180	5.63	11.75	66.2	150
	438	.. ..	.....	.....	.....	132.0	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	32,900	500	.0621	.0005	.02	—.01
B	33,100	500	.0657	.0010	—.06	0.

Test of the built post.

Tested with uneven bearings.

Yellow-pine strip ".1 thick placed behind north end of stick A. Same amount of packing placed behind south end of stick B.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	0.	
20,000	—.01	0.	.....	Ends not packed came to full bearing.
30,000	—.03	0.	.....	
40,000	—.03	0.	.....	
60,000	—.04	0.	.....	
80,000	—.05	0.	.....	
100,000	—.05	0.	.....	
120,000	—.05	0.	—.01	
140,000	—.05	0.	.....	
160,000	—.05	0.	.....	
180,000	—.05	+.01	.....	
200,000	—.05	+.01	—.05	
210,000	—.03	+.01	.....	
220,000	—.03	+.01	.....	
230,000	—.01	+.01	.....	
240,000	0.	+.01	.....	
250,000	+.01	.02	—.07	
260,000	.07	.02	.....	
270,000	.09	.02	.....	
280,000	.02	—.01	—.07	
290,000	—.01	—.02	.....	
298,000	—.21	—.05	.....	Ultimate strength = 2,273 pounds per square inch.

Final deflection took place in minus horizontal direction. Loads were continued after passing the maximum till the horizontal deflection was

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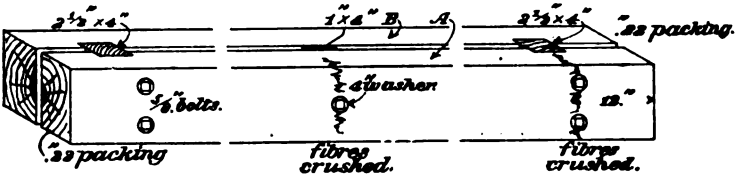
increased to —1″.10, developing lines of failure by crushing the fibers at the notched ends of stick A.

No. 676.



Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Ganged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	201	12	179.94	5.60	11.71	65.6	150
B	184	6	179.94	5.61	11.73	65.8	150
	385	.....	.....	.....	.....	131.4	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	32,800	500	.0530	.0003	.06	.01
B	32,900	500	.0523	0.	—.05	0.

Test of the built post.

Tested with uneven bearings.

Strip of yellow pine ″.22 thick placed behind north end of stick A. Same amount of packing placed behind south end of stick B.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	0.	
20,000	—.05	+.01	.....	North end of stick B reached a full bearing at 26,000 pounds.
30,000	—.10	+.01	.....	
40,000	—.12	+.01	.....	
50,000	—.12	+.01	.....	South end of stick A reached a bearing at 33,000 pounds.
60,000	—.12	+.02	.....	
80,000	—.11	+.08	.....	
100,000	—.09	+.05	—.04	
120,000	—.08	.09	.....	
140,000	—.07	.10	.....	
160,000	—.06	.11	.....	
180,000	—.05	.11	.....	
200,000	—.04	.11	—.06	
220,000	—.04	.11	.....	
230,000	—.03	.10	.....	
240,000	—.05	.10	.....	
250,000	—.06	.10	.....	
260,000	—.09	.08	.....	
270,000	—.10	.08	.....	
274,500	—.11	.....	.....	Ultimate strength = 2,089 pounds per square inch.

Failed by crushing the fibers of stick A at notch 12″ from south end and at the middle.

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No. 677.

Same style of post as No. 676.

1" space.

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	185	6	180	5.61	11.72	65.7	150
B	193	6	180	5.58	11.72	65.4	150
	378	.....	.....	.....	.....	131.1	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	32,850	500	.0551	.0004	.07	0.
B	32,700	500	.0625	.0005	— .08	.....

Test of the built post.

Tested with uneven bearings. Yellow-pine stick ".32 thick placed behind north end of stick A. Same amount of packing used behind south end of stick B.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	0.	
20,000	— .01	.01	.....	
30,000	— .06	.04	.....	
40,000	— .07	.04	.....	
50,000	— .07	.03	.02	
60,000	— .07	.03	.....	
80,000	— .05	.03	.....	
100,000	— .03	.03	.....	
120,000	— .01	.03	.....	
140,000	— .01	.04	.....	
160,000	0.	.02	.....	
180,000	0.	.04	.....	
200,000	0.	.04	.....	
220,000	0.	.04	.....	
240,000	— .01	.04	.....	
250,000	— .02	.04	.07	
255,000	.16	.07	.....	Ultimate strength = 1,945 pounds per square inch.

Stick A failed at a group of knots 15" from end.

Stick B failed at knots 40" from end; also fibers crushed where the stick was notched to receive packing block.

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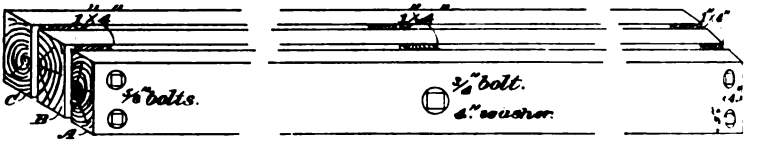
No. 690.



Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	175	18	180	4.52	11.62	52.5	150
B	226	11	180	5.56	11.70	65.0	150
C	199	18	180	4.46	11.62	51.8	150
	600	.....	.....	.....	.....	169.3	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	26,250	500	.0460	0.	.18	.01
B	32,500	500	.0580	.0008	— .02	0.
C	25,900	500	.0480	.0008	.20	.02

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
0	0.	0.	0.	
20,000	— .04	.01	.....	
40,000	— .07	.03	.....	
60,000	— .06	.03	.....	
80,000	— .05	.05	.....	
100,000	.05	.05	.05	
140,000	.04	.06	.....	
180,000	.03	.07	.....	
200,000	.02	.08	.08	
220,000	0.	.09	.....	
240,000	0.	.10	.....	
260,000	— .02	.11	.....	
280,000	— .06	.11	.....	
300,000	— .12	.12	.....	
310,000	— .32	.16	.....	Ultimate strength = 1,831 lbs. per square inch.

Stick A failed at a knot 54″ from the end of post.
Stick B failed at a knot 33″ from the end of post.

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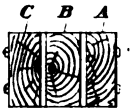
No. 691.

Same style of post as No. 690.



1" spaces.

Preliminary test of the single sticks.

Stick.	Weight.	Ring per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	164	9	179.98	4.48	11.60	52.0	150
B	197	14	179.98	5.56	11.60	64.5	150
C	159	12	179.98	4.45	11.61	51.7	150
	520	.....	.....	.....	.....	168.2	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	26,000	500	.0526	.0010	— .15	0.
B	32,250	500	.0430	.0002	0.	— .01
C	25,850	500	.0390	.0002	.01	.01

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
0	0.	0.	0.	
20,000	0.	.02	.....	
40,000	— .01	.03	.....	
60,000	— .02	.03	.....	
80,000	— .02	.02	.....	
100,000	— .03	.01	.07	
140,000	— .04	.01	.....	
180,000	— .06	0.	.....	
200,000	— .07	0.	.10	
220,000	— .07	0.	.....	
240,000	— .08	0.	.....	
260,000	— .09	0.	.....	
280,000	— .10	0.	.....	
300,000	— .11	0.	.....	
310,000	— .14	0.	.....	
320,000	— .16	0.	.....	
330,000	— .17	0.	.....	
340,000	— .20	0.	.....	
350,000	— .21	.01	.....	
360,000	— .28	.03	.....	
372,500	— .50	.....	.....	Ultimate strength = 2,215 lbs. per square inch.

Stick A crushed 22″ from middle.

Stick C crushed 8″ from middle, both failures occurring in the vicinity of knots.

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No. 692.

Same style of post as No. 690, except two outside sticks got out of 6″×12″ timber, middle stick got out of 5″×12″ timber.

Preliminary test of the single sticks.

Stick.	Weight.	Ring per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	248	13	177.25	5.62	11.60	65.2	150
B	153	12	177.25	4.59	11.60	52.2	150
C	213	5	177.25	5.60	11.57	64.8	150
	614	.....	.....	.....	.....	182.2	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	32,000	500	.0580	.0001	.06	.01
B	26,100	500	.0641	.0006	.08	.01
C	32,400	500	.0768	.0012	— .06	0.

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
0	0.	0.	0.	
20,000	0.	0.	.....	
40,000	0.	0.	.....	
60,000	.01	0.	.....	
80,000	.01	.01	.....	
100,000	.01	.03	.05	
140,000	.01	.06	.....	
180,000	0.	.09	.....	
200,000	0.	.09	— .10	
220,000	.01	.10	.....	
240,000	— .02	.10	.....	
260,000	— .04	.11	.....	
280,000	— .05	.12	.....	
300,000	— .07	.12	— .15	
310,000	— .08	.13	.....	
320,000	— .07	.16	.....	
330,000	— .07	.19	— .27	
340,000	— .09	.20	.....	
350,000	— .11	.21	.....	
360,000	— .18	.21	.....	
363,000	— .39	.21	.....	Ultimate strength=1,992 pounds per square inch.

Stick C failed at a knot 1¼″ diameter, 10″ from middle.
Stick B failed at a group of knots 8″ from middle.

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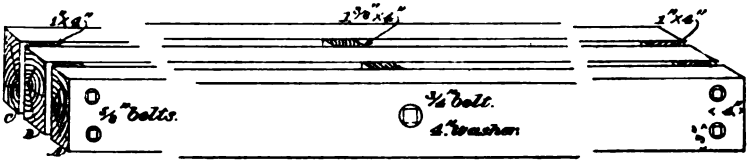
No. 687.

SWELLED POST.



1″ spaces at ends.
1⅜″ spaces at middle.

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	151	11	180	4.50	11.60	52.2	150
B	218	8	180	5.58	11.62	64.8	150
C	167	9	180	4.52	11.59	52.4	150
	536	.....	.....	.....	.....	169.4	....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	26,100	500	.0460	0.	—.27	0.
B	32,400	500	.0587	.0007	.02	0.
C	26,200	500	.0533	.0008	.25	.02

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
0	0	0.	0.	
20,000	.02	.03	0.	
40,000	.01	.04	.....	
60,000	.01	.05	.....	
80,000	.01	.06	.....	
100,000	.01	.07	.03	
140,000	0.	.08	.....	
180,000	0.	.08	.....	
200,000	—.01	.08	.05	
220,000	—.01	.08	.....	
240,000	—.04	.07	.....	
260,000	—.05	.08	.....	
280,000	—.08	.10	.....	
300,000	—.10	.08	.07	
320,000	—.21	.09	.....	
325,500	—.34	.09	.....	Ultimate strength = 1,919 pounds per square inch.

Fibers of stick A failed at a knot 12″ from middle. Stick C crushed fibers at a knot at middle of post.

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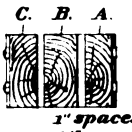
No. 688.

Same style of post as No. 687.



Direction of final deflection.

1" spaces at ends.
1⅛" " " middle.

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	176	10	180	4.50	11.60	52.2	150
B	236	10	180	5.62	11.60	65.2	150
C	163	11	180	4.50	11.60	52.2	150
	575	.....	.....	.....	.....	169.6	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per sq. inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	26,100	500	.0565	.0002	—.29	—.01
B	32,500	500	.0645	0.	—.10	—.01
C	26,100	500	.0703	.0003	.29	.03

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
0	0.	0.	0.	
20,000	0.	0.	.....	Sticks A and B have poor appearance; color of wood dull, lifeless. Stick B contains 15 knots from ¾" to 1¼" diameter.
40,000	0.	.02	.....	
60,000	0.	.05	.....	
80,000	0.	.06	.....	
100,000	0.	.07	—.08	
140,000	—.01	.08	.....	
180,000	—.01	.08	.....	
200,000	—.02	.08	.....	
220,000	—.03	.08	.....	
240,000	—.04	.08	.....	
260,000	—.06	.08	.....	
280,000	—.10	.06	.....	
300,000	—.21	.06	.....	
306,000	—.40	.06	.....	Ultimate strength = 1,804 pounds per square inch.

Failed by horizontal deflection, minus direction. Stick B failed at a knot at middle.

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No. 689.

Same style of post as No. 687.

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	188	7	180.05	4.48	11.60	52.0	150
B	203	11	180.05	5.60	11.62	65.1	150
C	159	9	180.05	4.46	11.57	51.6	150
	550	.....	.....	.....	.....	168.7	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per sq. inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	26,000	500	.0510	.0008	— .03	0.
B	32,550	500	.0660	.0002	— .10	0.
C	25,800	500	.0789	.0015	.26	.04

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
0	0.	0.	0.	
20,000	.05	.02	0.	
40,000	.05	.04	.....	
60,000	.04	.06	.....	Stick C has 20 knots in it from ¾" to 1¼" diameter.
80,000	.04	.06	.....	
100,000	.03	.06	— .07	
140,000	.03	.07	.....	
180,000	.02	.09	.....	
200,000	.01	.10	— .10	
220,000	.01	.11	.....	
240,000	0.	.11	.....	
260,000	0.	.11	.....	
280,000	— .01	.12	.....	
300,000	.01	.12	—.13	
320,000	— .04	.14	.....	
340,000	— .14	.15	.....	Ultimate strength = 2,015 pounds per square inch.

Sustained maximum load 3 minutes, increasing horizontal deflection from —".14 to —".60.

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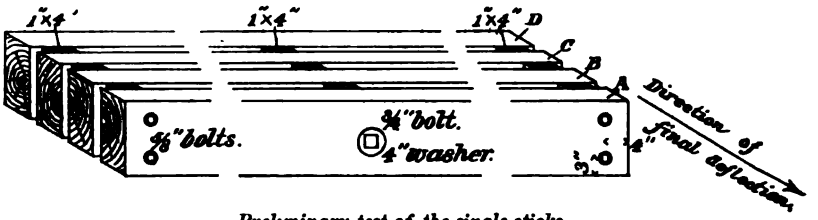
No. 681



Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	193	5	179.95	4.47	11.60	51.9	150
B	192	5	179.95	4.52	11.65	52.7	150
C	146	9	179.95	4.48	11.65	52.2	150
D	157	9	179.95	4.51	11.65	52.5	150
	688	.....	.....	.....	.....	209.3	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per sq. inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	25,950	500	.0700	.0008	—.04	0.
B	26,350	500	.0714	.0003	.06	0.
C	26,100	500	.0531	.0004	—.12	0.
D	26,250	500	.0762	.0006	0.	.01

Test of the built post.

Loads applied.	Loads per square inch.	Compression.	Compression set.	Deflections.			Remarks.
				Horizontal.	Vertical, W.	Vertical, E.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.	0.	0.	0.	0.	Compression measured for 150" on stick A.
104,650	500	.0575	.....	.....	.....	.....	
0	0	.....	0.	.....	.....	.....	
20,000	.....	.....	.....	0.	.02	.....	
40,000	.....	.....	.....	0.	.05	.....	
60,000	.....	.....	.....	0.	.06	.....	
80,000	.....	.....	.....	0.	.07	.....	
100,000	.....	.....	.....	0.	.08	—.07	
140,000	.....	.....	.....	0.	.09	.....	
180,000	.....	.....	.....	—.01	.10	.....	
200,000	.....	.....	.....	—.02	.10	—.05	
240,000	.....	.....	.....	—.05	.10	.....	
280,000	.....	.....	.....	—.08	.10	.....	
300,000	.....	.....	.....	—.10	.11	—.06	
340,000	.....	.....	.....	—.18	.12	.....	
350,000	.....	.....	.....	—.26	.12	.....	
360,000	.....	.....	.....	—.38	.13	.....	
363,000	1,734	.....	.....	.....	.....	.....	Ultimate strength.

Failed by horizontal deflection, minus direction; fibers of sticks B and C crushed at middle of post, at some knots.

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No. 682.

Same style of post as No. 681.

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Ganged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	161	7	180	4.50	11.63	52.3	150
B	156	14	180	4.50	11.64	52.4	150
C	163	7	180	4.49	11.60	52.1	150
D	151	9	180	4.50	11.63	52.3	150
	631	.....	.....	.....	.....	209.1	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per sq. inch.				
	Pounds		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	26,150	500	.0612	.0005	0.	0.
B	26,200	500	.0546	.0004	—.06	—.01
C	26,050	500	.0542	.0002	0.	0.
D	26,150	500	.0916	.0007	0.	0.

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
0	0.	0.	0.	
20,000	.02	.03	.....	
40,000	.02	.09	—.09	
60,000	.02	.10	.....	
80,000	.02	.10	.....	
100,000	.02	.10	.....	
140,000	.01	.10	.....	
180,000	0.	.10	.....	
200,000	0.	.10	—.07	
240,000	—.01	.10	.....	
280,000	—.02	.10	.....	
300,000	—.03	.10	—.04	
340,000	—.07	.09	.....	
360,000	—.11	.07	.....	
380,000	—.17	.10	.....	
400,000	—.26	.08	0.	
410,000	—.50	.10	.....	
414,000	—.70	.....	.....	Ultimate strength = 1,980 pounds per square inch.

Post deflected horizontally, minus direction.
Stick D crushed at knots 24″ from middle.

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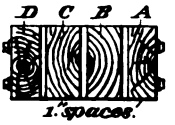
No. 683.

Same style of post as No. 681.



Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	169	10	180.03	4.46	11.63	51.9	150
B	219	11	180.03	5.62	11.69	65.7	150
C	218	9	180.03	5.60	11.70	65.5	150
D	181	7	180.03	4.46	11.61	51.8	150
	.....	.....	.....	.....	.....	234.9	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per sq. inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	25,950	500	.0570	0.	.01	0.
B	32,850	500	.0530	.0002	0.	0.
C	32,750	500	.0494	.0008	.04	0.
D	25,900	500	.0560	0.	—.04	0.

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
0	0.	0.	0.	
20,000	0.	0.	.....	
40,000	0.	0.	.....	
60,000	0.	0.	.....	
80,000	0.	0.	.....	
100,000	0.	.01	0.	
140,000	0.	.02	.....	
180,000	0.	.02	.....	
200,000	0.	.02	.04	
240,000	0.	.02	.....	
280,000	0.	.02	.....	
300,000	—.01	.02	.....	
340,000	—.01	.02	.....	
380,000	—.01	.02	.....	
400,000	—.01	.02	.....	
420,000	0.	.02	.....	
440,000	0.	.02	.....	
460,000	.01	.02	.....	
480,000	.04	.02	.....	
500,000	.13	.02	.13	
501,000	.....	.....	.....	Ultimate strength = 2,133 pounds per square inch.

Stick A crushed 24″ from middle.
Stick B crushed 26″ from middle.
Stick C crushed 8″ from middle.
All failures occurring in the vicinity of knots.

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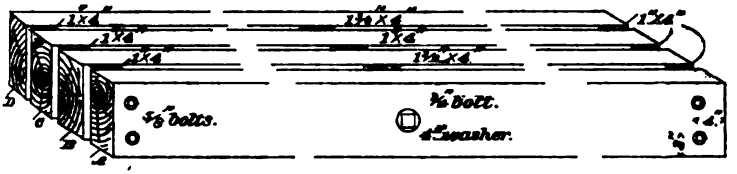
No. 684.

SWELLED POST.



Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	146	10	180	4.50	11.64	52.4	150
B	210	12	180	5.64	11.59	65.4	150
C	284	7	180	5.60	11.56	64.8	150
D	166	10	180	4.48	11.61	52.0	150
	756	.....	.....	.....	.....	234.6	.....

Stick.	Loads applied.		Compression.	Compression set.	Horisontal deflection.	Permanent horisontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	26,200	500	.0664	.0006	—.18	0.
B	33,700	500	.0610	.0004	.03	0.
C	32,460	500	.0548	0.	0.	.01
D	26,000	500	.0514	.0002	.22	.01

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horisontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
0	0.	0.	0.	
20,000	0.	.01	.....	
40,000	0.	0.	.....	
60,000	0.	0.	.....	
80,000	0.	—.01	.....	
100,000	0.	—.02	.02	
140,000	0.	—.04	.....	
180,000	0.	—.04	.....	
200,000	0.	—.04	.05	
240,000	0.	—.04	.....	
280,000	0.	—.05	.....	
300,000	0.	—.05	.09	
340,000	0.	—.05	.....	
380,000	0.	—.05	.....	
400,000	0.	—.06	.12	
420,000	.01	—.06	.....	
440,000	.03	—.06	.....	
460,000	.03	—.07	.....	
480,000	.04	—.07	.....	
470,000	.06	—.08	.....	
480,000	.08	—.08	.....	
490,000	.10	—.06	.....	
500,000	.10	—.06	.....	
510,000	.15	—.08	.....	
520,000	.20	—.08	.....	
522,000	.45	—.08	.....	Ultimate strength = 2,255 pounds per square inch.

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Stick A, fibers crushed at middle.
Stick B, fibers crushed 32″ from middle.
Stick C, fibers crushed 8″ from middle of post.

No. 685.

Same style of post as No. 684.

End spaces 1″ each,
inside middle space 1″,
outside " spaces 1⅛″ each.

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Ganged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	145	10	180	4.50	11.60	52.2	150
B	220	10	180	5.63	11.62	65.4	150
C	209	12	180	5.61	11.62	65.2	150
D	166	9	180	4.48	11.62	52.0	150
	740	.....	.....	.....	.....	234.8	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	26,100	500	.0645	.0005	— .30	0.
B	32,700	500	.0650	.0002	.07	.01
C	32,600	500	.0506	.0004	.05	0.
D	26,000	500	.0546	.0005	.35	.02

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
0	0.	0.	0.	
20,000	.02	.03	.02	
40,000	.03	.05	.....	
60,000	.03	.05	.....	
80,000	.03	.05	.....	
100,000	.03	.05	.....	
140,000	.04	.05	.....	
180,000	.05	.05	.....	
200,000	.05	.05	.11	
240,000	.07	.05	.....	
280,000	.09	.05	.....	
300,000	.10	.05	.11	
340,000	.12	.05	.....	
380,000	.15	.05	.....	
400,000	.17	.05	.....	
420,000	.13	.05	.....	
430,000	.04	.05	.....	Ultimate strength = 1,631 pounds per square inch.

Sticks A and C failed at some knots 42″ from the north end of the pots.

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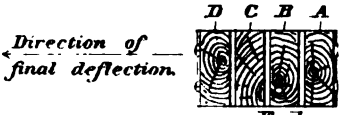
No. 686.

Same style of post as No. 684.



End spaces 1" each, inside middle space 1", outside " spaces 1⅝" each.

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	145	11	180	4.48	11.61	52.0	150
B	183	10	180	4.50	11.56	52.0	150
C	159	12	180	4.50	11.36	51.1	150
D	150	8	180	4.52	11.61	52.5	150
	637	.....	.....	.....	.....	207.6	.....

Stick.	Loads applied. Actual.	Loads applied. Pounds per square inch.	Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	26,000	500	.0500	.0002	−.25	−.02
B	26,000	500	.0315	0.	.07	.01
C	25,550	500	.0543	.0002	.02	.01
D	26,250	500	.0680	.0005	.05	.01

Test of the built post.

Loads applied.	Deflections. Horizontal.	Vertical, W.	Vertical, E.	Remarks.
Pounds.	*Inch.*	*Inch.*	*Inch.*	
0	0.	0.	0.	
20,000	0.	.05	0.	Stick A has very poor appearance. Dead wood along the corner about 3 square inches area.
40,000	0.	.10	.....	
60,000	0.	.13	.....	
80,000	0.	.14	.....	
100,000	.01	.15	0.	
120,000	.01	.14	.....	
140,000	.02	.14	.....	
160,000	.02	.14	.....	
180,000	.02	.14	.....	
200,000	.03	.14	.....	
220,000	.04	.14	.....	
240,000	.04	.14	.01	
260,000	.04	.14	.....	
280,000	.05	.14	.....	
300,000	.06	.13	.....	
320,000	.07	.13	.....	
340,000	.09	.12	.....	
360,000	.11	.11	.04	
380,000	.17	.11	.....	
395,000	Ab't. 30	.....	.....	Ultimate strength = 1,903 pounds per square inch.

Failed by horizontal deflection in plus direction. Horizontal deflection increased rapidly when the ultimate load was reached. Fibers of stick A crushed at the ¾" bolt-hole, and in vicinity of two knots ¾" diameter at middle, a sharp bend occurring at this point.

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COMPRESSION OF WHITE PINE POSTS.

TABULATED RESULTS.

Number of test.	Weight.	Average rate of growth.	Size of post.			Sectional area.	Ultimate strength.		Manner of failure.
			Length.	Width.	Depth.		Actual.	Pounds per square inch.	
	Pounds.	*Rings per inch.*	*Ft. In.*	*Inches.*	*Inches.*	*Square inches.*	*Pounds.*		
511	7	.....	15	5.50	5.50	30.25	108,000	3,570	Fibers crushed.
491	26½	.....	4 11.95	5.48	5.48	30	111,000	3,700	Failed at a knot 14″ from end of post.
492	31	.....	5 .05	5.48	5.48	30	99,300	3,100	Failed at a knot 15″ from end of post.
493	43½	.....	7 6.10	5.50	5.52	30.4	67,400	2,217	Failed at knots 28″ from end of post.
494	37½	.....	7 6.10	5.47	5.47	29.9	70,800	2,368	Failed at knots 16″ from end of post.
495	45	.....	7 6.10	5.50	5.45	29.8	74,100	2,487	Failed at knots 20″ and 25″ from end of post.
512	62½	.....	10 .10	5.48	5.49	30.1	82,000	2,724	Failed at knots 40″ from end of post.
519	49½	.....	10 .10	5.48	5.42	29.7	75,400	2,539	Failed at knots near middle of post.
520	59½	.....	10 .10	5.45	5.45	29.7	61,700	2,077	Failed at knots 30″ from end of post.
516	60	.....	12 6.15	5.46	5.46	29.8	68,000	2,282	Failed at knots 64″ from end of post.
517	70	.....	12 6.16	5.50	5.50	30.25	70,800	2,340	Failed at knots 58″ from end of post.
518	67½	.....	12 6.10	5.48	5.52	30.25	100,000	3,306	Failed at knots 31″ from end of post.
513	84½	.....	15 .27	5.47	5.47	29.9	54,000	1,806	Failed at knots 66″ from end of post.
514	90	.....	15 .31	5.48	5.48	30	93,500	3,117	Deflected diagonally and failed at knots.
515	91	.....	15 .28	5.33	5.33	28.4	94,000	3,310	Do.
531	96½	.....	17 6.24	5.35	5.35	28.6	53,000	1,853	Do.
522	101	.....	17 6.25	5.40	5.38	29	40,500	1,396	Deflected downward; wind-shake on concave side.
523	95	.....	17 6.22	5.33	5.35	28.5	64,800	2,274	Deflected horizontally.
524	109½	.....	20 .25	5.28	5.26	27.8	45,000	1,619	Deflected diagonally.
525	106½	.....	20 .27	5.29	5.27	27.9	39,500	1,416	Do.
526	95	.....	20 .28	5.25	5.29	27.8	37,000	1,331	Deflected horizontally.
505	110	.....	22 6.26	5.16	5.18	26.7	37,000	1,386	Do.
506	113	.....	22 6.23	5.20	5 22	27.1	37,200	1,373	Do.
507	118	.....	22 6.26	5.18	5.18	26.8	46,700	1,743	Do.
502	127	.....	25 .31	5.27	5.25	27.7	30,900	1,116	Deflected diagonally.
503	125	.....	25 .34	5.25	5.25	27.6	25,800	935	Deflected sideways.
504	127	.....	25 .37	5.25	5.25	27.6	22,200	804	Deflected diagonally.
496	169	.....	27 6.35	5.32	5.34	28.4	32,500	1,144	Do.
497	173	.....	27 6.40	5.35	5.35	28.6	32,000	1,119	Do.
498	157	.....	27 6.39	5,35	5.35	28.6	28,000	979	Do.
569	94	.....	6 8.07	7.77	9.64	74.9	204,000	2,724	Failed at knots 10″ from middle of post.
575	93	7	6 8.10	7.70	9.70	74.7	177,000	2,369	Failed at knots near middle of post
571	120½	12	6 8.13	7.73	9.63	74 4	185,000	2,487	Failed at knots 9″ from end of post.
573	160	15	10 .13	7.75	9.62	74.6	186,000	2,493	Failed at knots 21″ from end of post.

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576	166	11	10	.16	7.72	9.76	75.3	204,600	2,717	Failed at knots 13″ and 27″ from end of post.
577	160	10	10	.18	7.73	9.74	75.3	186,000	1,793	Failed at knots 8″ and 11″ from end of post.
581	231	7	13	4.12	7.75	9.76	75.6	168,000	2,222	Failed at knots 14″ and 44″ from end of post.
582	182	8	13	4.14	7.75	9.76	75.6	127,500	1,687	Failed at knots 13″ and 18″ from end of post.
583	196½	13	13	4.14	7.48	9.23	69.0	208,500	3,022	Failed at knots 50″ from end of post.
590	242	7	16	8.20	7.72	9.63	74.3	161,000	2,167	Failed at knots 20″ from end of post.
591	210½	9	16	8.22	7.78	9.58	74.5	163,000	2,188	Failed at knots near middle of post.
592	274	8	16	8.21	7.75	9.75	75.6	175,300	2,319	Failed at knots 75″ from end of post.
533	278	.....	20	.24	7.59	9.62	73.0	140,000	1,918	Deflected horizontally.
534	285	.....	20	.26	7.38	9.29	68.6	166,000	2,420	Failed at knot near middle of post.
535	293	....	20	.25	7.39	9.27	68.5	206,000	3,007	Failed at knot 24″ from middle of post.
539	352	.....	23	4.20	7.73	9.75	75.4	140,000	1,857	Deflected horizontally.
540	357	.....	23	4.20	7.72	9.61	74.2	170,000	2,291	Do.
541	340	.....	23	4.18	7.63	9.50	72.5	150,000	2,069	Deflected diagonally.
536	427	.....	26	8.20	7.46	9.36	69.8	169,000	2,421	Deflected horizontally.
537	397	.....	26	8.89	7.49	9.34	70.0	140,000	2,000	Do.
538	384	.....	26	8.27	7.46	9.37	69.9	134,000	1,917	Deflected horizontally; knots on concave side.
702	300	10	15	.02	5.60	15.58	87.2	159,000	1,823	Failed at knots 23″ from end of post.
703	267	5	15	.08	5.61	15.60	87.5	168,500	1,926	Deflected horizontally.
704	267	12	15	.00	5.65	15.60	88.1	165,000	1,873	Do.
699	356	7	15	.00	6.60	15.64	103.2	240,000	2,326	Failed at knots 40″ from end of post.
700	395	10	14	11.94	6.60	15.64	103.2	239,000	2,316	Failed at knots 10″ and 60″ from end of post.
701	376	7	15	.00	6.60	15.60	103	203,000	1,971	Failed at knots 15″ from middle of post.
705	657	6	15	.03	8.47	16.43	139.2	279,400	2,007	Failed at knots at middle of stick.
706	437	5	15	.00	8.48	16.46	139.6	292,000	2,092	Do.
707	447	5	14	11.93	8.48	16.48	139.8	359,000	2,568	Deflected horizontally; fibers crushed near end of post.

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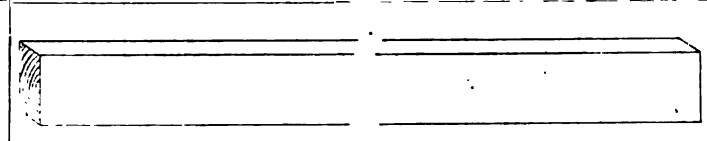
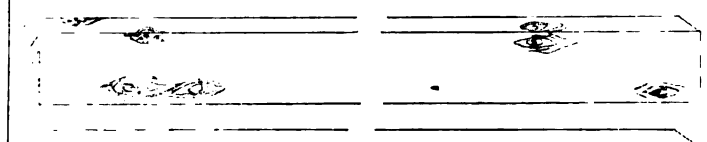
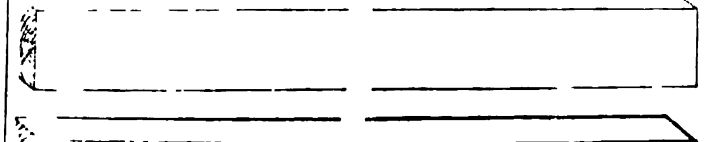
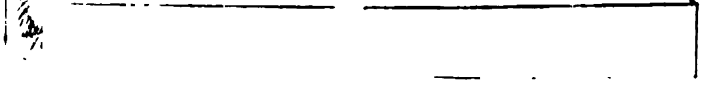
COMPRESSION OF WHITE PINE.

Single sticks and built posts.

TABULATED RESULTS.

Number of test.	Kind of post.	Weight.	Average rate of growth. Rings per inch.	Dimensions of post.			Sectional area.	Compression in 150 inches. Load of 500 pounds per square inch.	Ultimate strength.	
				Length.	Width.	Depth.			Actual.	Pounds per square inch.
		Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inch.*	*Pounds.*	
664		153	11	177.50	4.48	11.65	52.2	.0545	110,000	2,107
665		143	10	180	4.48	11.64	52.1	.1010	81,500	1,564
666		163	5	179.97	4.47	11.63	52.0	.0895	70,000	1,346
667		228	13	180	5.40	11.30	61.0	.0505	160,000	2,623

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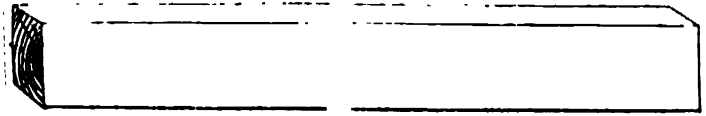
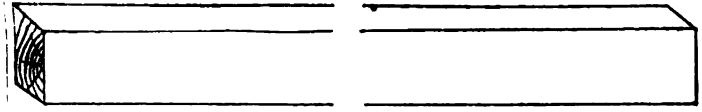
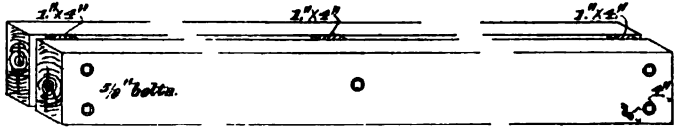
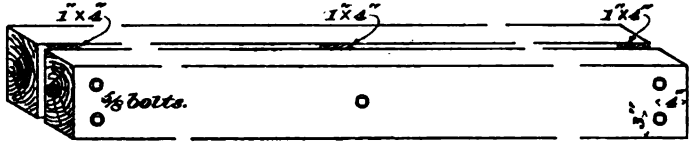
668		193	5	179.93	5.61	11.73	65.8	.0622	156,300	2,375
669		253	5	180	5.64	11.76	66.3	.0608	152,300	2,297
638		181 134 } 315	6 8	180 180	4.50 4.50	11.60 11.59	52.2 52.2 } 104.4	.0670 .0750	200,000	1,916
639	Same style as No. 638	182 167 } 349	7 5	180 180	4.52 4.49	11.66 11.62	52.7 52.2 } 104.9	.0645 .0670	212,000	2,021
640	Same style as No. 638	131 158 } 289	7 5	180 180	4.53 4.52	11.59 11.59	52.5 52.5 } 105.0	.1060 .0955	149,000	1,419
642		192 306 } 498	6 7	179.98 179.98	5.57 5.58	11.61 11.61	64.7 64.7 } 129.4	.0770 .0390	215,000	1,661
643	Same style as No. 642	203 189 } 392	17 5	179.92 179.92	5.65 5.61	11.61 11.62	65.6 65.2 } 130.8	.0440 .0600	261,000	1,995
644	Same style as No. 642	227 236 } 463	7 7	179.96 179.96	5.60 5.60	11.63 11.62	65.1 65.1 } 130.2	.0596 .0690	257,800	1,980

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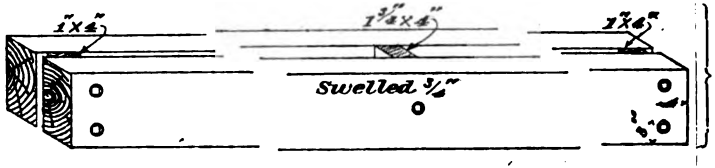
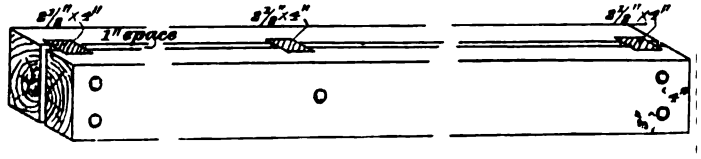
COMPRESSION OF WHITE PINE—Continued.

Number of test.	Kind of post.	Weight.	Average rate of growth. Rings per inch.	Dimensions of post. Length.	Width.	Depth.	Sectional area.	Compression in 150 inches. Load of 500 pounds per square inch.	Ultimate strength. Actual.	Pounds per square inch.
		Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inch.*	*Pounds.*	
648		206 } 409 203 }	12 10	180 180	5.60 5.61	11.72 11.72	65.6 } 131.2 65.6 }	.0590 .0700	268,000	2,042
649	Same style as No. 648	187 } 371 184 }	9 4	180 180	5.60 5.61	11.71 11.74	65.6 } 131.5 65.9 }	.0600 .0705	277,000	2,107
650	Same style as No. 648	194 } 384 190 }	12 9	180 180	5.61 5.61	11.75 11.71	65.9 } 131.6 65.7 }	.0530 .0885	240,000	1,824
645		215 } 481 266 }	5 7	179.97 179.97	5.59 5.60	11.59 11.60	64.8 } 129.8 65.0 }	.0560 .0540	263,200	2,028
646	Same style as No. 645	206 } 410 204 }	6 12	180 180	5.59 5.60	11.61 11.62	64.9 } 130.0 65.1 }	.0493 .0620	249,000	1,915
647	Same style as No. 645	192 } 384 192 }	11 13	180 180	5.62 5.62	11.62 11.62	65.3 } 130.6 65.3 }	.0630 .0700	248,000	1,899

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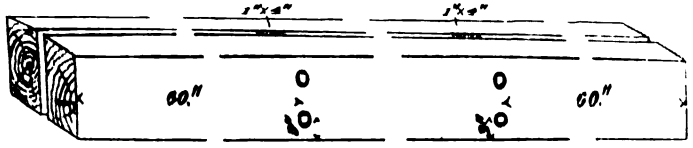
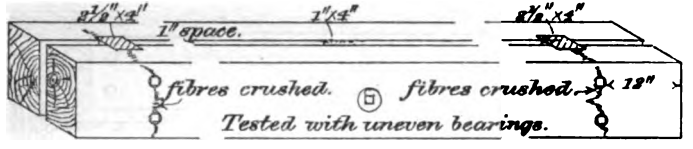
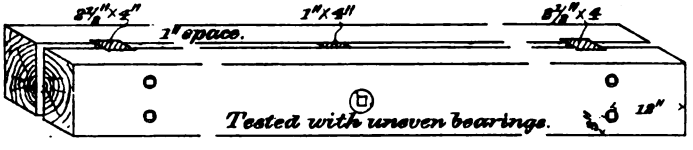
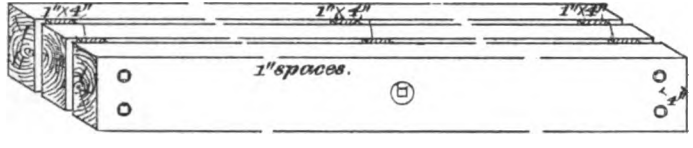
678		251 215	466	16 8	179.94 179.94	5.58 5.57	11.47 11.45	64.0 63.8	127.8	.0529 .0642	245,500	1,921
679	Same style as No. 678	209 190	399	12 7	180 180	5.62 5.62	11.76 11.72	66.1 65.9	132.0	.0664 .0705	249,000	1,886
680	Same style as No. 678	268 278	546	8 8	180 180	5.60 5.61	11.72 11.73	65.6 65.8	131.4	.0650 .0495	278,000	2,116
663		230 208	438	14 6	180 180	5.60 5.63	11.75 11.75	65.8 66.2	132.0	.0621 .0657	300,000	2,273
676		201 184	385	12 6	179.94 179.94	5.60 5.61	11.71 11.73	65.6 65.8	131.4	.0530 .0593	274,500	2,089
677	Same style of post as No. 676. Tested with uneven bearings	185 193	378	6 6	180 180	5.61 5.58	11.72 11.72	65.7 65.4	131.1	.0551 .0625	255,000	1,945
690		175 226 199	600	18 11 18	180 180 180	4.52 5.56 4.46	11.62 11.70 11.62	52.5 65.0 51.8	169.3	.0460 .0580 .0480	810,000	1,831
691	Same style as No. 690	164 197 159	520	9 14 12	179.98 179.98 179.98	4.48 5.56 4.45	11.60 11.60 11.61	52.0 64.5 51.7	168.2	.0526 .0430 .0390	372,500	2,215

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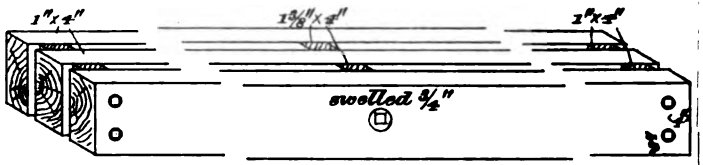
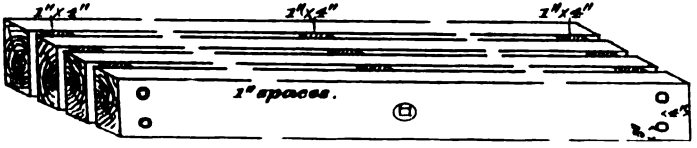
COMPRESSION OF WHITE PINE—Continued.

Number of test.	Kind of post.	Weight.	Average rate of growth. Rings per inch.	Dimensions of post. Length.	Width.	Depth.	Sectional area.	Compression in 150 inches. Load of 500 pounds per square inch.	Ultimate strength. Actual.	Pounds per square inch.
		Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inch.*	*Pounds.*	
692	Same style as No. 690	248 153 } 614 213	13 12 } 5 5	177.25 177.25 177.25	5.62 4.50 5.60	11.60 11.60 11.57	65.2 52.2 } 182.2 64.8	.0580 .0641 .0768	363,000	1,992
687		151 218 } 536 167	11 8 } 9 9	180 180 180	4.50 5.58 4.52	11.60 11.62 11.59	52.2 64.8 } 169.4 52.4	.0460 .0587 .0533	325,500	1,919
688	Same style as No. 687	176 236 } 575 163	10 10 } 10 11	180 180 180	4.50 5.62 4.50	11.60 11.60 11.60	52.2 65.2 } 169.6 52.2	.0565 .0645 .0703	306,000	1,804
689	Same style as No. 687	188 203 } 550 159	7 11 } 9 9	180.05 180.05 180.05	4.48 5.60 4.46	11.60 11.62 11.57	52.0 65.1 } 168.7 51.6	.0510 .0660 .0789	340,000	2,015
691		193 192 146 157 } 688	5 5 9 9 } 5	179.95 179.95 179.95 179.95	4.47 4.52 4.48 4.51	11.60 11.65 11.65 11.65	51.9 52.7 52.2 52.5 } 209.3	.0700 .0714 .0581 .0762	363,000	1,734

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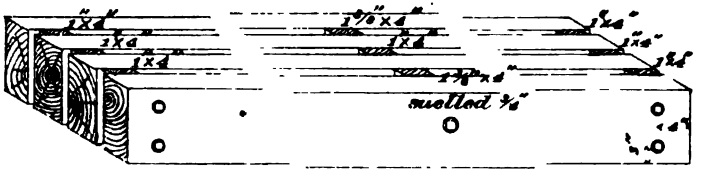
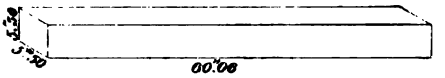
682	Same style as No. 681	161 158 163 151	631	7 14 7 9	180 180 180 180	4.55 4.50 4.49 4.50	11.68 11.64 11.60 11.63	52.7 52.4 52.1 52.3	209.1	.0612 .0546 .0543 .0916	414,000	1,980
683	Same style as No. 681	169 219 218 181	787	10 11 9 7	180.03 180.03 180.03 180.03	4.46 5.62 5.60 4.46	11.63 11.69 11.70 11.61	51.9 65.7 65.5 51.8	234.9	.0570 .0530 .0494 .0590	501,000	2,133
684	 3 x 4 3 x 4 3 x 4

COMPRESSION TESTS OF YELLOW-PINE POSTS.

No. 565.

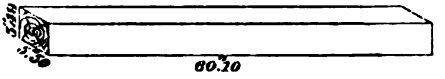


Average growth, 20 rings per inch.
Sectional area, 3.03 square inches.
Gauged length, 50″.
Weight, 47 pounds.
Not counterweighted.
Post free from knots.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,030	100	0.	.....	
15,150	500	.0108	.....	
.....	100	.....	0.	
30,300	1,000	.0225	.....	
.....	100	.....	.0005	
45,450	1,500	.0350	.....	
.....	100	.....	.0010	
60,600	2,000	.0485	.....	
.....	100	.....	.0020	
172,000	5,677	.....	.....	Ultimate strength.

Crushed fibers 12″ from end.

No. 566.



Average growth, 12 rings per inch.
Sectional area, 30.2 square inches.
Gauged length, 50″.
Weight, 44 pounds.
Not counterweighted.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,020	100	0.	.....	
15,100	500	.0126	.....	
.....	100	.....	.0002	
30,200	1,000	.0247	.....	
.....	100	.....	.0002	
45,300	1,500	.0430	.....	
.....	100	.....	.0007	
60,400	2,000	.0590	.....	
.....	100	.....	.0010	
141,000	4,669	.....	.....	Ultimate strength.

Failed at knots 15″ from end.

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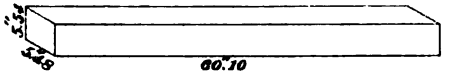
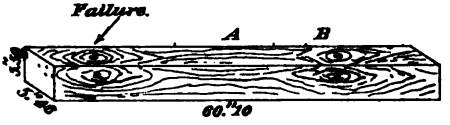
No. 567.



Sectional area, 30.4 square inches.
Gauged length, 50″.
Weight, 45 pounds.
Not counterweighted.
Average growth, 25 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,040	100	0.	.....	
15,200	500	.0080	.....	
.....	100	.....	0.	
30,400	1,000	.0200	.....	
.....	100	.....	0.	
45,600	1,500	.0318	.....	
.....	100	.....	0.	
60,800	2,000	.0441	.....	
.....	100	.....	.0005	
168,000	5,526	.....	.....	Ultimate strength.

Failed at knots at 9″ and 17″ from end.



No. 568.

Sectional area, 30 square inches.
Weight, 47½ pounds.
Not counterweighted.
Post has a large knot near each end, straight-grain section between the knots.
Two gauged lengths.
Gauged length A, 15″ on straight-grain section.
Gauged length B, 10″ on section containing knot.
Average growth, 20 rings per inch.

Loads applied.	Pounds per square inch.	Compression.		Permanent set.		Remarks.
		Section A.	Section B.	Section A.	Section B.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
3,000	100	0.	.....	0.	.....	
15,000	500	.0033	.....	.0058	.....	
30,000	1,000	.0070	.....	.0139	.....	
.....	100	.....	0.	.....	.0008	
45,000	1,500	.0165	.....	.0225	.....	
60,000	2,000	.0140	.....	.0315	.....	
.....	100	.....	0.	.....	.0025	
108,000	3,600	.....	.....	.....	.....	Ultimate strength.

Failed at knot 8″ from end.

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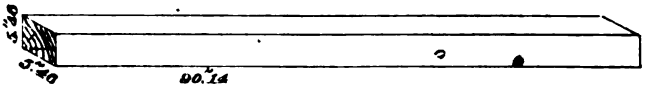
No. 562.

Sectional area, 30.1 square inches.
Gauged length, 50″
Weight, 72½ pounds.
Not counterweighted.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
3,010	100	0.		
15,050	500	.0114		
	100		0.	
30,100	1,000	.0250		
	100		0.	
45,150	1,500	.0395		
	100		.0005	
60,200	2,000	.0537		
	100		.0010	
140,000	4,651			Ultimate strength.

Failed by opening season cracks and crushing fibers.

No. 563.

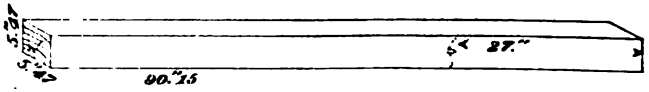


Sectional area, 29.8 square inches.
Gauged length, 50″.
Weight, 59½ pounds.
Not counterweighted.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,980	100	0.		
14,900	500	.0123		
	100		0.	
29,800	1,000	.0280		
	100		.0004	
44,700	1,500	.0445		
	100		.0010	
59,600	2,000	.0621		
	100		.0021	
124,000	4,161			Ultimate strength.

Failed at some knots 30″ from end.

No. 564.



Sectional area, 29.9 square inches.
Gauged length, 50″.
Weight, 57 pounds.
Not counterweighted.

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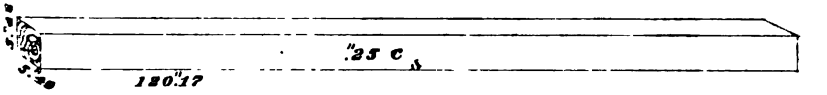
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,990	100	0.	.....	
14,950	500	.0100	.....	
.....	100	.....	0.	
29,900	1,000	.0226	.....	
.....	100	.....	.0002	
44,850	1,500	.0370	.....	
.....	100	.....	.0005	
59,800	2,000	.0512	.....	
.....	100	.....	.0009	
143,500	4,799	.....	.....	Ultimate strength.

Crushed fibers at knot, 27″ from end.

No. 559.

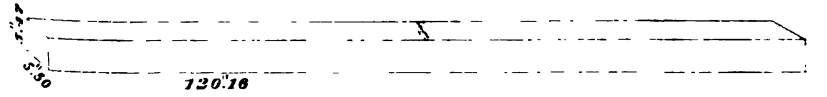


Sectional area, 30.1 square inches.
Gauged length, 100.″
Weight, 86 pounds.
Not counterweighted.
Initial deflection before dressed from size 6″×6″: Horizontal, ″.25.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
3,010	100	0.	.....	0.	0.	
15,050	500	.0190	.....	0.	0.	
.....	100	.....	0.	0.	0.	
30,100	1,000	.0440	.....	0.	.01	
.....	100	.....	0.	0.	0.	
45,150	1,500	.0700	.....	0.	.01	
.....	100	.....	.0002	0.	0.	
60,200	2,000	.0964	.....	0.	.01	
.....	100	.....	.0010	0.	0.	
80,000	.....	.....	.....	0.	.01	
100,000	.....	.....	.....	0.	.01	
120,000	.....	.....	.....	.02	.01	
140,000	.....	.....	.....	.07	.04	
146,200	4,857	.....	.....	.15	.15	Ultimate strength.

Failed by deflecting upwards, crushing fibers in the vicinity of knots at middle of post.

No. 560.



Sectional area, 30.1 square inches.
Gauged length, 100″.
Weight, 88½ pounds.
Not counterweighted.
Cross-grained stick with season cracks.

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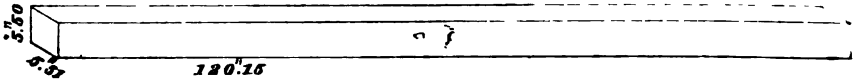
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
3,010	100	0.		0.	0.	
15,050	500	.0207		—.01	—.03	
	100		.0010	0.	0.	
30,100	1,000	.0480		—.04	—.10	
	100		.0010			
45,150	1,500	.0750		—.06	—.16	
	100		.0018	0.	0	
60,200	2,000	.1030		—.06	—.21	
	100		.0025	0.	0.	
70,000				—.07	—.28	
80,000				—.07	—.34	
90,000				—.06	—.40	
100,000				—.05	—.46	
110,000				—.05	—.46	
120,000					—.70	
130,000					—.90	
139,000	4,618					Ultimate strength.

Failed, crushing fibers at knot at middle of post; deflected downward.

No. 561.



Sectional area, 30.3 square inches.
Gauged length, 100″.
Weight, 110 pounds.
Not counterweighted.
Worm-eaten post.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
3,030	100	0.		0.	0.	
15,150	500	.0164		—.01	0.	
	100		0.	0.	0.	
30,300	1,000	.0385		—.01	0.	
	100		0.	0.	0.	
45,450	1,500	.0600		—.02	—.02	
	100		0.	0.	0.	
60,600	2,000	.0820		—.02	—.04	
	100		.0010	0.	0.	
70,000				—.02	—.05	
80,000				—.04	—.06	
90,000				—.05	—.07	
100,000				—.05	—.09	
110,000				—.05	—.10	
120,000				—.06	—.11	
130,000				—.07	—.12	
140,000				—.10	—.13	
143,600	4,739					Ultimate strength.

Failed by crushing fibers in vicinity of knot at middle of post.

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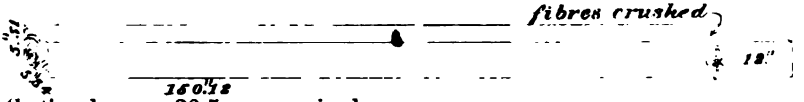
No. 556.

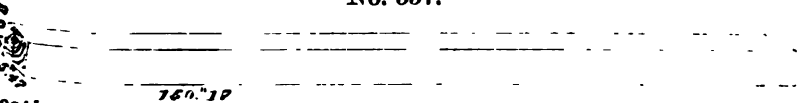


Sectional area, 30.5 square inches.
Weight, 126 pounds.
Gauged length, 100″.
Counterweight at middle, 64 pounds.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
3,050	100	0.	.....	0.	0.	
15,250	500	.0190	.....	.01	0.	
.....	100	.....	0.	0.	0.	
30,500	1,000	.0438	.....	.03	0.	
.....	100	.....	−.0006	0.	0.	
45,550	1,500	.0680	.....	.05	0.	
.....	100	.....	.0004	0.	0.	
61,000	2,000	.0932	.....	.08	0.	
.....	100	.....	.0002	0.	0.	
70,000	.....	.....	.....	.09	0.	
80,000	.....	.....	.....	.11	0.	
90,000	.....	.....	.....	.14	0.	
100,000	.....	.....	.....	.16	0.	
110,000	.....	.....	.....	.19	0.	
120,000	.....	.....	.....	.23	0.	
130,000	.....	.....	.....	.28	−.02	
140,000	.....	.....	.....	.35	−.05	
150,000	.....	.....	.....	.49	−.11	
156,000	5,114	.....	.....	.85	−.11	Ultimate strength.

Failed by deflection sideways. Crushed fibers at knot 12″ from end of post.

No. 557.



Sectional area, 30.2 square inches.
Gauged length, 100″.
Weight, 128 pounds.
Counterweight at middle, 64 pounds.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
3,020	100	0.	.....	0.	0.	
15,100	500	.0166	.....	0.	0.	
.....	100	.....	0.	0.	0.	
30,200	1,000	.0386	.....	0.	0.	
.....	100	.....	.0007	0.	0.	
45,300	1,500	.0610	.....	−.02	−.01	
.....	100	.....	.0009	0.	0	
60,400	2,000	.0840	.....	−.04	−.03	
.....	100	.....	.0010	0.	0.	
70,000	.....	.....	.....	−.05	−.04	
80,000	.....	.....	.....	−.06	−.06	
100,000	.....	.....	.....	−.10	−.10	
110,000	.....	.....	.....	−.11	−.11	
120,000	.....	.....	.....	−.14	−.13	
130,000	.....	.....	.....	−.18	−.16	
140,000	.....	.....	.....	−.24	−.20	
150,000	.....	.....	.....	−.34	−.29	
156,000	5,166	.....	.....	−.70	−.50	Ultimate strength.

Failed by deflecting diagonally downward and sideways.

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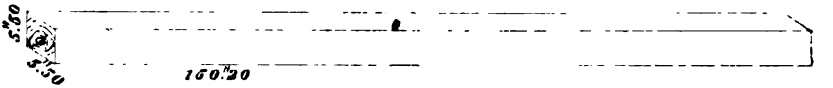
No. 558.

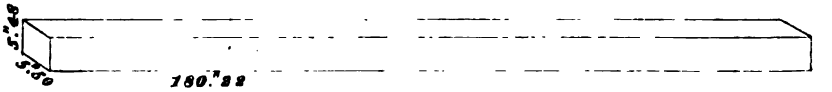


Sectional area, 30.3 square inches.
Gauged length, 100″.
Weight, 141½ pounds.
Counterweight at middle, 64 pounds.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
3,030	100	0.	.....	0.	0.	
15,150	500	.0172	.....	— .07	0.	
.....	100	.....	0.	0.	0.	
30,300	1,000	.0400	.....	— .12	0.	
.....	100	.....	— .0004	— .01	0.	
45,450	1,500	.0629	.....	— .17	0.	
.....	100	.....	— .0003	— .01	0.	
60,600	2,000	.0865	.....	— .19	— .02	
.....	100	.....	— .0002	— .01	0.	
70,000	.....	.....	.....	— .21	— .04	
80,000	.....	.....	.....	— .22	— .05	
90,000	.....	.....	.....	— .25	— .06	
100,000	.....	.....	.....	— .27	— .08	
110,000	.....	.....	.....	— .29	— .09	
120,000	.....	.....	.....	— .31	— .10	
130,000	.....	.....	.....	— .36	— .11	
140,000	.....	.....	.....	— .40	— .12	
150,000	4,950	.....	.....	— .66	— .12	Ultimate strength.

Failed by deflecting sideways and upwards, changing the direction of the vertical deflections after passing the maximum load.

No. 553.



Sectional area, 30.1 square inches.
Weight, 140 pounds.
Gauged length, 100″.
Counterweight at middle, 64 pounds.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
3,010	100	0.	.....	0.	0.	
15,050	500	.0230	.....	.01	.04	
.....	100	.....	.0002	0.	0.	
30,100	1,000	.0552	.....	.01	.05	
.....	100	.....	0.	0.	.01	
40,000	.....	.....	.....	+ .02	.06	
50,000	.....	.....	.....	+ .02	.07	
60,000	.....	.....	.....	+ .02	.07	
70,000	.....	.....	.....	.04	.04	
80,000	.....	.....	.....	.05	0.	
90,000	.....	.....	.....	.08	— .10	
99,200	3,296	.....	.....	.27	— .80	Ultimate strength.

Failed by deflecting downward.

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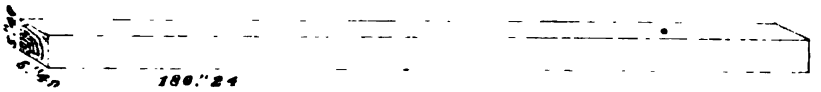
No. 554.



Sectional area, 30 square inches.
Gauged length, 100″.
Weight, 148 pounds.
Counterweight at middle, 76 pounds.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
3,000	100	0.	.....	.03	.03	
15,000	500	.0189	.....	.03	.03	
.....	100	.....	0.	.03	.03	
30,000	1,000	.0435	.....	.03	.01	
.....	100	.....	0.	.03	.03	
45,000	1,500	.0688	.....	.03	0.	
.....	100	.....	.0002	.03	.03	
60,000	2,000	.0935	.....	.04	— .02	
.....	100	.....	0.	.03	.03	
70,000	.....	.....	.....	.05	— .02	
80,000	.....	.....	.....	.07	— .03	
90,000	.....	.....	.....	.07	— .04	
100,000	.....	.....	.....	.10	— .06	
110,000	.....	.....	.....	.13	— .07	
120,000	.....	.....	.....	.20	— .08	
130,000	4,333	.....	.....	.52	— .02	Ultimate strength.

Failed by deflecting sideways, reversing the vertical deflections and bending upward slightly.

No. 555.

Sectional area, 30.3 square inches.
Gauged length, 100″.
Weight, 148 pounds.
Counterweight at middle, 76 pounds.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
3,030	100	0.	.....	0.	0.	
15,150	500	.0200	.....	— .02	— .01	
.....	100	.....	0.	0.	0.	
30,300	1,000	.0450	.....	— .05	— .02	
.....	100	.....	0.	0.	0.	
45,450	1,500	.0706	.....	— .05	— .02	
.....	100	.....	.0011	— .01	0.	
60,600	2,000	.0970	.....	— .06	— .02	
.....	100	.....	.0016	— .01	0.	
70,000	.....	.....	.....	— .07	— .02	
80,000	.....	.....	.....	— .07	— .02	
90,000	.....	.....	.....	— .07	— .03	
100,000	.....	.....	.....	— .08	— .04	
110,000	.....	.....	.....	— .11	— .06	
120,000	.....	.....	.....	— .16	— .09	
129,000	4,257	.....	.....	— .50	— .30	Ultimate strength.

Failed by deflecting diagonally downward and sideways.

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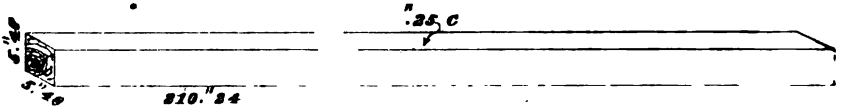
No. 550.

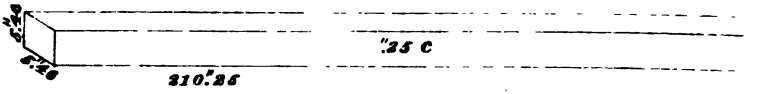


Sectional area, 30 square inches.
Weight, 172 pounds.
Counterweight at middle, 88 pounds.
Initial deflection before stick was dressed down from size 6″ × 6″
Vertical, — ″.25.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
2,000				— .06	— .08	
4,000				— .06	— .06	
6,000				— .06	— .05	
8,000				— .06	— .04	
10,000				— .06	— .02	
14,000				— .06	— .01	
18,000				— .07	0.	
20,000				— .08	0.	
22,000				— .09	0.	
26,000				— .10	0.	
30,000				— .10	0.	
34,000				— .11	0.	
38,000				— .13	0.	
40,000				— .15	0.	
50,000				— .20	0.	
60,000				— .26	0.	
70,000				— .35	0.	
80,000				— .51	— .01	
90,000	3,000			—1.03	— .06	Ultimate strength.

Failed suddenly under the maximum load, deflecting sideways, splitting the stick at the middle where it was cross-grained.

No. 551.



Sectional area, 29.8 square inches.
Weight, 180½ pounds.
Counterweight at middle, 88 pounds.
Initial deflection before stick was dressed down from size 6″ × 6″
Horizontal, ″.25.

Loads applied.	Pounds per square inch.	Deflections.		Remarks.
		Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	
2,000		.09	.09	
4,000		.09	.09	
6,000		.10	.09	
8,000		.10	.09	
10,000		.10	.09	
14,000		.11	.09	

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Loads applied.	Pounds per square inch.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	
18,000	.....	.11	.09	
22,000	.....	.12	.09	
26,000	.....	.13	.09	
30,000	.....	.14	.09	
40,000	.....	.17	.09	
50,000	.....	.21	.10	
60,000	.....	.26	.10	
70,000	.....	.33	.11	
80,000	.....	.45	.12	
90,000	.....	.60	.14	
100,000	.....	.89	.20	
109,000	3 658	1.95	.50	Ultimate strength.

Deflected sideways.

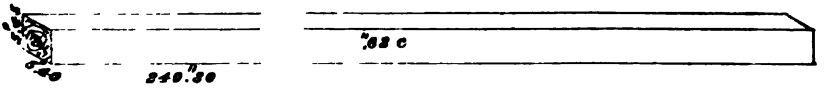
No. 552.

Sectional area, 30.3 square inches.
Weight, 167½ pounds.
Counterweight at middle, 88 pounds.

Loads applied.	Pounds per square inch.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,000	.....	0.	0.	
4,000	.....	0.	0.	
6,000	.....	0.	0.	
8,000	.....	0.	0.	
10,000	.....	0.	0.	
14,000	.....	—.01	0.	
18,000	.....	—.01	0.	
22,000	.....	—.02	.01	
26,000	.....	—.03	.01	
30,000	.....	—.03	.01	
40,000	.....	—.05	.01	
50,000	.....	—.06	.01	
60,000	.....	—.09	.01	
70,000	.....	—.14	.01	
80,000	.....	—.25	.01	
90,000	.....	—.52	.01	
93,000	3,069	—1.42	.01	Ultimate strength.

Deflected horizontally.

No. 548.



Sectional area, 29.4 square inches.
Weight, 185 pounds.
Counterweight at middle, 88 pounds.
Initial deflection before stick was dressed down from size 6″×6″: Horizontal, + ″.62.

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Loads applied.	Pounds per square inch.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,000		0.	0.	
4,000		— .05	.01	
6,000		— .07	.02	
8,000		— .08	.02	
10,000		— .09	.02	
14,000		— .10	.02	
18,000		— .11	.02	
22,000		— .13	.02	
26,000		— .15	.02	
30,008		— .17	.02	
34,000		— .19	.02	
38,000		— .20	.01	
42,000		— .23	.01	
46,000		— .25	0.	
50,000		— .30	0.	
54,000		— .32	0.	
56,000		— .35	0.	
58,000		— .36	0.	
62,000		— .40	0.	
66,000		— .50	0.	
70,000		— .60	0.	
74,000		— .75	0.	
78,000		—1.00	.05	
80,000		—1.28	.08	
82,000	2,789			Ultimate strength.

Failed by deflecting sideways.

No. 549.

Sectional area, 29.8 square inches.
Weight, 185 pounds.
Counterweight at middle, 88 pounds.
Post was $\frac{3}{8}''$ winding before dressed down from size $6'' \times 6''$.

Loads applied.	Pounds per square inch.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,000		— .04	— .06	
4,000		— .05	— .08	
6,000		— .05	— .10	
8,000		— .05	— .11	
10,000		— .05	— .12	
14,000		— .05	— .13	
18,000		— .05	— .14	
22,000		— .06	— .15	
26,000		— .06	— .16	
30,000		— .07	— .18	
40,000		— .09	— .22	
50,000		— .11	— .29	
54,000		— .16	— .40	
66,000		— .18	— .41	
68,000		— .20	— .43	
70,000		— .21	— .48	
72,000		— .22	— .52	
74,000		— .25	— .58	
76,000		— .26	— .61	
78,000		— .30	— .67	
80,000		— .34	— .75	
82,000		— .37	— .83	
84,000		— .45	— .96	
86,000		— .56	—1.13	
87,800	2,946	— .97	—1.59	Ultimate strength.

Deflected downward and sideways.

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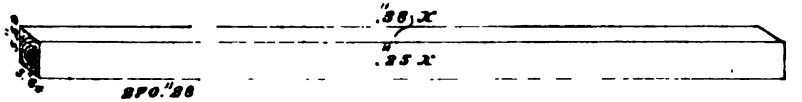
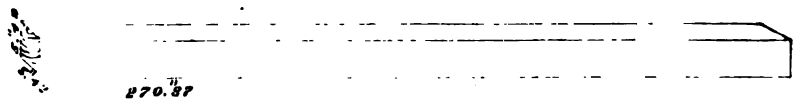
No. 545.



Sectional area, 31.5 square inches.
Weight, 212 pounds.
Counterweight at middle, 108 pounds.
Initial deflections before stick was dressed down from size 6″×6″: Horizontal, —″.25; vertical, +″.38.

Loads applied.	Pounds per square inch.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,000		—.10	0.	
4,000		—.10	0.	
6,000		—.10	0.	
8,000		—.10	.01	
10,000		—.11	.01	
12,000		—.11	.01	
16,000		—.12	.01	
20,000		—.15	.02	
24,000		—.16	.02	
28,000		—.18	.03	
30,000		—.20	.03	
32,000		—.20	.04	
34,000		—.22	.04	
36,000		—.23	.04	
38,000		—.25	.05	
40,000		—.27	.06	
42,000		—.28	.07	
44,000		—.30	.08	
46,000		—.32	.09	
48,000		—.34	.10	
50,000		—.36	.11	
52,000		—.38	.12	
54,000		—.40	.13	
56,000		—.45	.14	
58,000		—.49	.16	
60,000		—.54	.19	
62,000		—.60	.21	
64,000		—.68	.25	
66,000		—.75	.30	
68,000		—.86	.34	
70,000		—1.00	.43	
73,700	2,340	—1.75	.90	Ultimate strength.
		—2.80	1.80	Sudden spring when deflection reached this amount, sustaining about 60,000 pounds at the time.

No. 546.



Sectional area, 29.8 square inches.
Weight, 189 pounds.
Counterweight at middle, 96 pounds.
This stick was $\frac{3}{4}$″ winding before dressing down from size 6″×6″.

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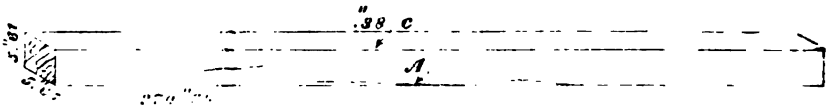
Loads applied.	Pounds per square inch.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,000	.....	.04	0.	
4,000	.....	.07	.03	
6,000	.....	.09	.06	
8,000	.....	.09	.08	
10,000	.....	.09	.09	
14,000	.....	.09	.11	
18,000	.....	.09	.13	
22,000	.....	.09	.16	
26,000	.....	.09	.19	
30,000	.....	.09	.22	
34,000	.....	.09	.26	
38,000	.....	.09	.31	
42,000	.....	.06	.37	
46,000	.....	.03	.47	
50,000	.....	− .02	.65	
54,000	.....	− .16	.98	
56,000	1,879	− .50	.....	Ultimate strength.

Failed by vertical deflection.

No. 547.



Sectional area, 31.7 square inches.
Weight, 266 pounds.
Counterweight at middle, 140 pounds.
Initial deflection before stick was dressed down from size 6″×6″: Vertical, −″.38.

Loads applied.	Pounds per square inch.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,000	.....	− .20	− .14	
4,000	.....	− .20	− .12	
6,000	.....	− .20	− .10	
8,000	.....	− .20	− .10	
10,000	.....	− .20	− .09	
14,000	.....	− .20	− .09	
18,000	.....	− .20	− .10	
22,000	.....	− .20	− .10	
26,000	.....	− .21	− .10	
30,000	.....	− .21	− .10	
34,000	.....	− .22	− .10	
38,000	.....	− .22	− .10	
42,000	.....	− .25	− .10	
46,000	.....	− .26	− .10	Snapping sounds.
50,000	.....	− .27	− .10	
54,000	.....	− .30	− .11	
58,000	.....	− .27	− .15	
62,000	.....	− .20	− .15	
62,500	1,972	.....	.....	Ultimate strength.

Failed by deflecting sideways in plus direction and upwards.

Before the maximum load was reached, crack at A opened on the convex side corner about ½ square inch, splintering partly off, forming a loop. At the time of maximum load this splinter broke by compression and at the same time the deflections were reversed, changing from minus to plus directions, the splintering corner now being on the concave side.

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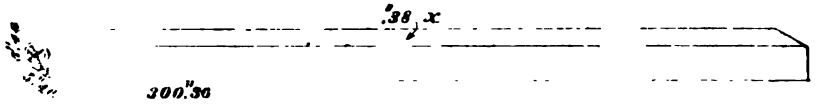
No. 508.



Sectional area, 29.9 square inches.
Weight, 210 pounds.
Counterweight at middle, 105 pounds.
Initial deflection before dressing down from size 6″×6″: Vertical, +″.38.

Loads applied.	Pounds per square inch.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,000		+ .18	+ .12	
4,000		+ .18	+ .12	
6,000		+ .18	+ .12	
8,000		+ .18	+ .12	
10,000		+ .18	+ .12	
12,000		.20	+ .12	
14,000		.21	+ .12	
16,000		.22	+ .12	
18,000		.24	.13	
20,000		.25	.14	
22,000		.29	.15	
24,000		.30	.17	
26,000		.33	.18	
28,000		.36	.18	
30,000		.40	.19	
32,000		.45	.20	
34,000		.50	.20	
36,000		.55	.22	
38,000		.59	.23	
40,000		.67	.25	
42,000		.76	.27	
44,000		.89	.30	
45,000		.97	.32	Snapping sounds.
46,000		1.06	.33	
47,000		1.17	.35	
18,000		1.30	.38	
49,000		1.45	.40	
50,000		1.68	.44	
51,000		1.95	.50	
52,000	1,739	2.40	.56	Ultimate strength.

Failed by deflecting sideways and upward.

No. 509.

Sectional area, 30 square inches.
Weight, 235 pounds.
Counterweight at middle, 117 pounds.

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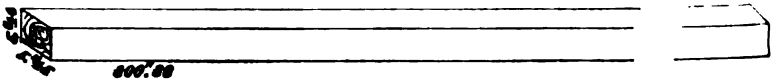
Loads applied.	Pounds per square inch.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,000		— .08	0.	
4,000		— .12	0.	
6,000		— .14	.01	
8,000		— .15	.02	
10,000		— .17	.02	
12,000		— .18	.03	
14,000		— .18	.04	
16,000		— .18	.05	
18,000		— .18	.05	
20,000		— .19	.05	
22,000		— .20	.06	
24,000		— .20	.06	
26,000		— .21	.07	
28,000		— .22	.08	
30,000		— .23	.09	
32,000		— .25	.10	
34,000		— .26	.10	
36,000		— .28	.10	
38,000		— .30	.11	
40,000		— .32	.11	
42,000		— .34	.11	
44,000		— .36	.11	
46,000		— .40	.11	
48,000		— .45	.11	
50,000		— .51	.11	
52,000		— .64	.12	
54,000		— .78	.12	
56,000		—1.00	.12	
58,000		—1.48	.12	
59,000	1,967	—2.12	.11	Ultimate strength.

No. 510.



Sectional area, 29.8 square inches.
Weight, 210 pounds.
Counterweight at middle, 105 pounds.
Post ".38 winding before dressing down from size 6″ × 6″.

Loads applied.	Pounds per square inch.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,000		— .04	+ .05	
4,000		— .01	+ .05	
6,000		0.	.04	
8,000		0.	.02	
10,000		0.	0.	
12,000		0.	0.	
14,000		0.	0.	
16,000		+ .01	— .02	
18,000		.02	— .04	
20,000		.02	— .05	
22,000		.03	— .06	
24,000		.04	— .07	
26,000		.06	— .08	
28,000		.08	— .09	
30,000		.10	— .10	
32,000		.12	— .11	
34,000		.13	— .12	
36,000		.15	— .13	
38,000		.18	— .15	
40,000		.22	— .16	
42,000		.26	— .17	
44,000		.30	— .18	
46,000		.40	— .20	
48,000		.50	— .20	
50,000		.63	— .20	
51,000		.75	— .20	
53,000		1.05	— .21	
54,000		1.38	— .21	
55,000		1.63	— .20	
55,500	1,862			Ultimate strength.

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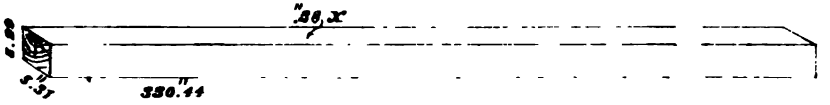
No. 499.



Sectional area, 28.1 square inches.
Weight, 258 pounds.
Counterweight at middle, 129 pounds.
Initial bend in post before dressing down from size 3″×6″: Vertical, +″.38.

Loads applied.	Pounds per square inch.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,000		0.	+.30	
3,000		0.	.30	
4,000		—.02	.24	
5,000		—.05	.20	
6,000		—.08	.16	
7,000		—.08	.15	
8,000		—.08	.13	
9,000		—.07	.12	
10,000		—.07	.10	
11,000		—.07	.10	
12,000		—.08	.10	
13,000		—.08	.10	
14,000		—.08	.10	
15,000		—.08	.08	
16,000		—.08	.08	
17,000		—.08	.08	
18,000		—.08	.08	
19,000		—.08	.08	
20,000		—.08	.08	
21,000		—.08	.08	
22,000		—.08	.08	
23,000		—.08	.08	
24,000		—.08	.08	
25,000		—.08	.08	
26,000		—.08	.08	
27,000		—.08	.07	
28,000		—.08	.07	
29,000		—.08	.06	
30,000		—.08	.06	
31,000		—.08	.06	
32,000		—.06	.05	
33,000		—.06	.05	
34,000		—.06	.05	
35,000		—.05	.05	
36,000		—.04	.05	
37,000		—.04	.05	
38,000		—.02	.05	
39,000		—.02	.05	
40,000		—.02	.04	
41,000		—.02	.04	
42,000		0	.04	
43,000		0	.04	
44,000		0	.03	
45,000		0	.02	
46,000		+.02	.01	
47,000		.05	.01	
48,000		.06	0.	
49,000		.08	0.	
50,000		.10	0.	
51,000		.12	0.	
52,000		.15	0.	
53,000		.19	0.	
54,000		.21	0.	
55,000		.27	0.	
56,000		.32	0.	
57,000		.44	0.	
58,000		.55	0.	
59,000		.72	—.03	
60,000		1.00	—.03	
60,800	2,163	2.00	—.03	Ultimate strength.

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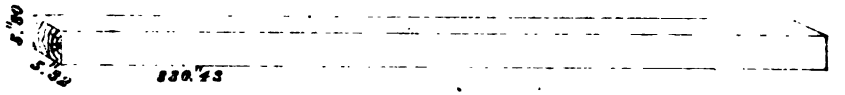
Failed by horizontal deflection, suddenly springing when the maximum load was reached, increasing the horizontal deflection to about 8″. Load released to 10,000 pounds and maximum loads repeated, sudden springing occurring when the following loads were reached: 56,000, 54,000, and 53,000 pounds.

Between each loading, strains were released to 10,000 pounds.

No. 500.



Sectional area, 28.2 square inches.

Weight, 236 pounds.

Counterweight at middle, 118 pounds.

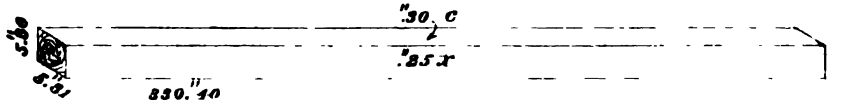
Initial bend before dressing down from 6″×6″ stick: Horizontal, —″.38; post winding, ″.38.

Loads applied.	Pounds per square inch.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,000		—.50	—.12	
4,000		—.45	—.12	
6,000		—.45	—.12	
8,000		—.45	—.12	
10,000		—.48	—.12	
12,000		—.50	—.17	
14,000		—.62	—.19	
16,000		—.56	—.20	
18,000		—.59	—.22	
20,000		—.62	—.25	
22,000		—.68	—.23	
24,000		—.74	—.30	
26,000		—.80	—.32	
28,000		—.90	—.37	Figures below refer to this curved line:
30,000		—1.00	—.40	
31,000		—1.05	—.45	
32,000		—1.13	—.50	
33,000		—1.20	—.53	
34,000		—1.30	—.56	Shape of stick while under 38,000 pounds compression. Ordinates measured each 2 feet.
35,000		—1.40	—.60	
36,000		—1.55	—.66	
37,000		—1.70	—.70	0, ″.28, ″.65, 1″.10, 1″.55, 1″.85, 2″.05, 2″.06, 1″.88, 1″.57, 1″.15, ″.70, ″.32, ″.15, ″.18, 0.
38,000		—1.95	—.79	
38,000		—2.18	—.92	
49,000	1,383	—2.70	—1.07	Ultimate strength.

Failed by horizontal and downward deflection. Deflected suddenly when load reached its maximum, increasing to about 8″ horizontal and vertical at middle.

Posts of this length and diameter have changed from triple flexure when sudden springing occurred to single flexure, like a post with pin ends.

No. 501.



Sectional area, 28.1 square inches.

Weight, 256 pounds.

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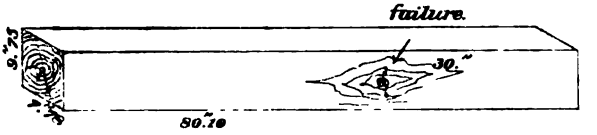
Counterweight at middle, 128 pounds.
Initial bend to stick before dressed down from size 6″×6″: Horizontal, —″.25; vertical, —″.30.

Loads applied.	Pounds per square inch.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	
2,000	.....	—.27	—.40	
4,000	.....	—.27	—.22	
6,000	.....	—.26	—.09	
8,000	.....	—.27	—.04	
10,000	.....	—.28	—.03	
12,000	.....	—.29	—.01	
14,000	.....	—.30	0.	
16,000	.....	—.31	.01	
18,000	.....	—.32	.02	
20,000	.....	—.35	.04	
22,000	.....	—.38	.05	
24,000	.....	—.38	.06	
26,000	.....	—.42	.07	
28,000	.....	—.47	.08	
30,000	.....	—.51	.10	
32,000	.....	—.56	.11	
34,000	.....	—.65	.12	
36,000	.....	—.75	.15	
38,000	.....	—.90	.16	
40,000	.....	—1.10	.20	
42,000	.....	—1.40	.26	
43,000	.....	—1.70	.32	
44,000	.....	—2.10	.42	
44,400	1,580	.....	.....	Ultimate strength.

Failed by deflection sideways and upward, springing suddenly soon after passing the maximum load, increasing the deflections to about —8″ horizontal, 2″ vertical.

No. 572.



Sectional area, 75.8 square inches.
Weight, 124 pounds.
Ganged length, 50″.
Not counterweighted.
Average growth, 6 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
7,580	100	0.	.....	
37,900	500	.0210	.....	
.....	100	.....	.0004	
75,800	1,000	.0460	.....	
.....	100	.....	.0011	
113,700	1,500	.0716	.....	
.....	100	.....	.0029	
151,600	2,000	.0994	.....	
.....	100	.....	.0055	
260,000	3,430	.....	.....	Ultimate strength.

Failed at a knot 2″ diameter, 30″ from end of post.

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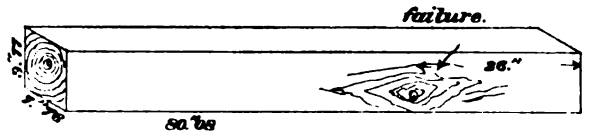
No. 573.

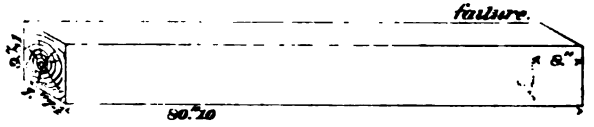


Sectional area, 75.8 square inches.
Weight, 131 pounds.
Gauged length, 50″.
Not counterweighted.
Average rate of growth, 14 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
7,580	100	0.		
37,900	500	.0113		
	100		0.	
75,800	1,000	.0270		
	100		.0005	
113,700	1,500	.0436		
	100		.0009	
151,600	2,000	.0595		
	100		.0012	
286,500	3,780			Ultimate strength.

Failed by crushing fibers at a knot 26″ from end of post.

No. 574.



Sectional area, 75.9 square inches.
Weight, 161½ pounds.
Gauged length, 50″.
Not counterweighted.
Average rate of growth, 21 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
7,590	100	0.		
37,950	500	.0110		
	100		0.	
75,900	1,000	.0245		
100			.0003	
113,850	1,500	.0390		
	100		.0008	
151,800	2,000	.0530		
	100		.0010	
383,000				Ultimate strength.

Fibers crushed about 8″ from end, in the vicinity of knots.

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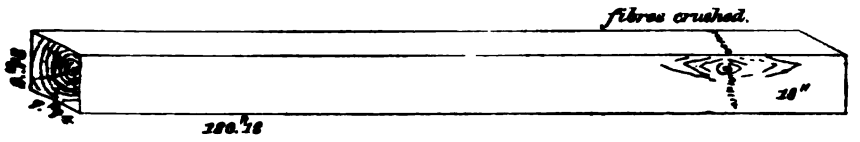
No. 578.

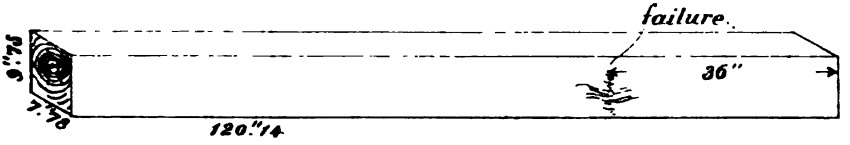


Sectional area, 75.3 square inches.
Weight, 233½ pounds.
Gauged length, 100″.
Not counterweighted.
Average rate of growth, 23 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
7,530	100	0.	.....	
37,650	500	.0230	.....	
.....	100	.....	.0007	
75,300	1,000	.0530	.....	
.....	100	.....	.0011	
112,950	1,500	.0839	.....	
.....	100	.....	.0018	
150,600	2,000	.1147	.....	
.....	100	.....	.0027	
304,000	4,037	.....	.....	Ultimate strength.

Failed at a knot 18″ from end of post.

No. 579.



Sectional area, 75.9 square inches.
Weight, 240 pounds.
Gauged length, 100″.
Not counterweighted.
Average growth, 19 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
7,590	100	0.	.....	
37,950	500	.0160	.....	
.....	100	.....	.0005	
75,900	1,000	.0375	.....	
.....	100	.....	.0008	
113,850	1,500	.0604	.....	
.....	100	.....	.0010	
151,800	2,000	.0840	.....	
.....	100	.....	.0010	
399,500	5,264	.....	.....	Ultimate strength.

Crushed fibers 36″ from end. Grain of the wood wavy at this place.

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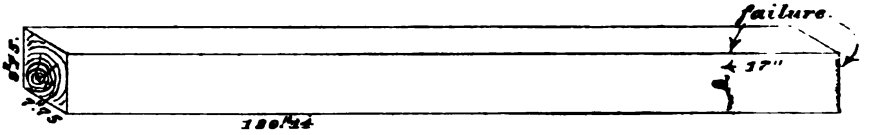
No. 580.

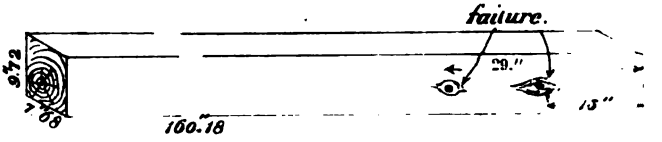


Sectional area, 75.6 square inches.
Weight, 240 pounds.
Gauged length, 100″.
Not counterweighted.
Average rate of growth, 28 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
7,560	100	0.		
37,800	500	.0175		
	100		0.	
75,600	1,000	.0415		
	100		0.	
113,400	1,500	.0663		
	100		0.	
151,200	2,000	.0913		
	100		0.	
350,000	4,629			Ultimate strength.

Crushed fibers at end of post and at knot 17″ from end.

No. 584.



Sectional area, 74.6 square inches.
Weight, 266 pounds.
Gauged length, 100″.
Not counterweighted.
Average rate of growth, 18 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
7,460	100	0.		
37,300	500	.0182		
	100		.0010	
74,600	1,000	.0465		
	100		.0017	
111,900	1,500	.0758		
	100			
149,200	2,000	.1080		
	100		.0035	
307,500	4,122			Ultimate strength.

Failed at knots 15″ and 29″ from end.

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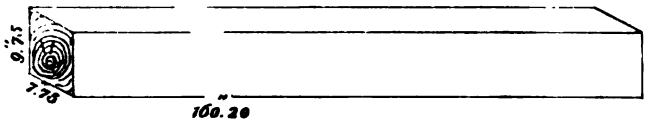
No. 585.

Sectional area, 75.5 square inches.
Gauged length, 100″.
Weight, 258 pounds.
Not counterweighted.
Average rate of growth, 6 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
7,550	100	0.		
37,750	500	.0287		
	100		0.	
75,500	1,000	.0700		
	100		.0006	
113,250	1,500	.1135		
	100		.0025	
151,000	2,000	.1600		
	100		.0061	
284,000	3,762			Ultimate strength.

Fibers crushed at knots 45″ from end and near the middle.
Post deflecting downward.

No. 586.



Sectional area, 75.5 square inches.
Weight, 336 pounds.
Gauged length, 100″.
Not counterweighted.
Average rate of growth, 23 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
7,550	100	0.		
37,800	500	.0220		
	100		0.	
75,600	1,000	.0525		
	100		.0002	
113,400	1,500	.0835		
	100		.0008	
151,200	2,000	.1150		
	100		.0015	
296,000	3,921			Ultimate strength.

Fibers crushed at knot near middle of post.

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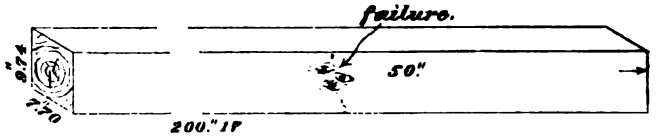
No. 587.

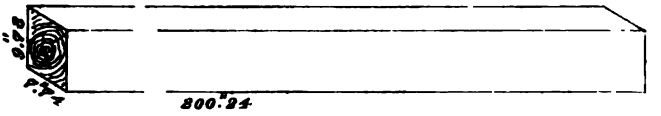


Sectional area, 75 square inches.
Gauged length, 150″.
Weight, 318 pounds.
Counterweight at middle, 158 pounds.
Average rate of growth, 24 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
7,500	100	0.	.....	0.	0.	
37,500	500	.0375	.....	0.	.05	
.....	100	.....	0.	0.	0.	
75,000	1,000	.0900	.....	0.	.06	
.....	100	.....	0.	0.	0.	
112,500	1,500	.1450	.....	0.	.08	
.....	100	.....	.0020	0.	0.	
150,000	2,000	.2015	.....	0.	.11	
.....	100	.....	.0055	0.	.01	
200,000	.....	.....	.....	0.	.17	
250,000	.....	.....	.....	.10	.20	
74,500	3,660	.....	.....	.70	.25	Ultimate strength.

Failed at a group of knots 50″ from end, maximum deflection at this point.

No. 588.



Sectional area, 75.3 square inches.
Gauged length, 150″.
Weight, 381 pounds.
Counterweight at middle, 190 pounds.
Average rate of growth, 12 rings per inch.

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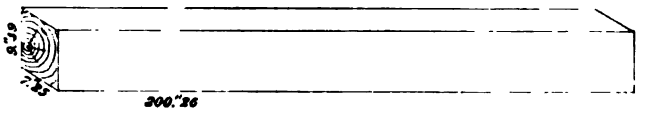
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
7,530	100	0.		0.	0.	This post is free from knots; straight grain.
37,650	500	.0330		0.	— .02	
	100		.0011	0.	0.	
75,300	1,000	.0730		0.	— .04	
	100		.0020	0.	0.	
112,950	1,500	.1125		0.	— .07	
	100		.0030	0.	0.	
150,600	2,000	.1520		0.	— .07	
	100		.0040	0.	0.	
200,000				.02	— .09	
250,000				.04	— .10	
300,000				.08	— .12	
350,000				.15	— .17	
382,000	5,073					Ultimate strength.

Failed by deflecting sideways.

No. 589.

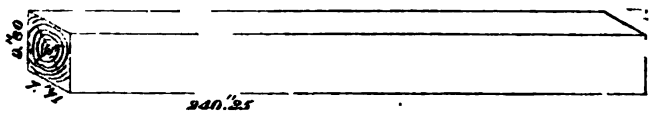


Sectional area, 68.8 square inches.
Gauged length, 150″.
Weight, 339½ pounds.
Counterweight at middle, 170 pounds.
Average rate of growth, 21 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
6,880	100	0.		0.	0.	Season cracks in post running diagonally.
34,400	500	.0365		0.	0.	
	100		.0016	0.	0.	
68,800	1,000	.0800		.01	.03	
	100		.0025	0.	0.	
103,200	1,500	.1240		.03	.06	
	100		.0035	0.	0.	
137,600	2,000	.1688		.04	.10	
	100		.0050	0.	0.	
250,000				.08	.20	
300,000				— .15	.24	
304,000	4,419			— .50	.23	Ultimate strength.

Failed by deflecting sideways.

No. 530.



Sectional area, 75.6 square inches.
Gauged length, 200″.

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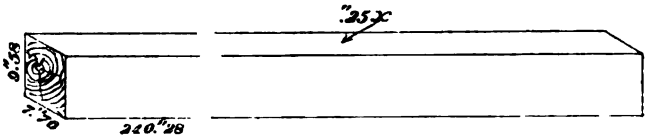
Weight, 461 pounds.
Counterweight at middle, 225 pounds.
Straight-grained, free from knots.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
7,560	100	0.	.....	0.	0.	
37,800	500	.0422	.....	.01	.01	
.....	100	.....	0.	0.	0.	
75,600	1,000	.0958	.....	.04	.03	
.....	100	.....	.0009	0.	0.	
113,400	1,500	.1515	.....	.09	.05	
.....	100	.....	.0012	0.	0.	
151,200	2,000	.....	.....	.14	.07	
160,000	.....	.....	.....	.15	.08	
170,000	.....	.....	.....	.17	.10	
180,000	.....	.....	.....	.19	.10	
189,000	2,500	.....	.....	.20	.10	
200,000	.....	.....	.....	.22	.11	
210,000	.....	.....	.....	.25	.12	
220,000	.....	.....	.....	.28	.12	
230,000	.....	.....	.....	.32	.13	
240,000	.....	.....	.....	.35	.14	
250,000	.....	.....	.....	.41	.15	
260,000	.....	.....	.....	.49	.16	
270,000	.....	.....	.....	.65	.19	
280,000	.....	.....	.....	.95	.24	
287,000	3,796	.....	.....	1.60	.24	Ultimate strength.

Failed by horizontal deflection.
Strains continued, increasing the deflection to 3″.05 at middle. Ordinates now measured each 20″ to show the curve of flexure.

No. 531.



Sectional area, 74.3 square inches.
Gauged length, 200″.
Weight, 410 pounds.
Counterweight at middle, 225 pounds.
Post has 18 knots from ¾″ to 2″ diameter. Initial bend in stick before dressing down from size 8″ × 10″: Vertical, +″.25.

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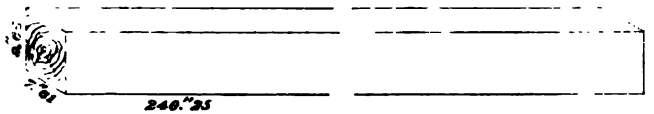
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		Inch.	Inch.	Inch.	Inch.	
7, 430	100	0.		0.	0.	
37, 150	500	.0510		0.	— .03	
	100		.0005	0.	0.	
74, 300	1, 000	.1095		.01	— .04	
	100		.0010	0.	0.	
111, 450	1, 500	.1693		.02	— .06	
	100		.0027	0.	0.	
148, 600	2, 000	.2300		.03	— .06	
	100		.0038	0.	0.	
160, 000				.03	— .06	
170, 000				.04	— .06	
180, 000				.04	— .07	
190, 000				.04	— .07	
200, 000				.04	— .08	
210, 000				.05	— .09	
220, 000				.05	— .09	
230, 000				.07	— .10	
240, 000				.09	— .10	
250, 000				.12	— .12	
260, 000				.18	— .15	
270, 000				.32	— .20	
275, 000	3, 701			.82	— .24	Ultimate strength.

Failed at some knots 70″ from the end. Maximum deflection developed at this point.

No. 532.



Sectional area, 73.7 square inches.
Gauged length, 200″.
Weight, 391 pounds.
Counterweight at middle, 225 pounds.
Post ¾″ winding before dressing down from size 8″ × 10″.
Cross-grained stick; season cracks take diagonal direction.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflection. Horizontal.	Deflection. Vertical.	Remarks.
Pounds.		Inch.	Inch.	Inch.	Inch.	
7, 370	100	0.		0.	0.	
36, 850	500	.0515		— .02	.04	
	100		0.	0.	0.	
73, 700	1, 000	.1190		— .06	.10	
	100		.0005	0.	0.	
110, 550	1, 500	.1865		— .10	.16	
	100		.0010	0.	0.	
147, 400	2, 000			— .19	.25	
160, 000				— .22	.29	
170, 000				— .26	.31	
180, 000				— .32	.35	
190, 000				— .36	.40	
200, 000				— .48	.43	
210, 000				— .66	.48	
220, 000	2, 985			—1.08	.54	Ultimate strength.

Failed by horizontal and vertical deflection.

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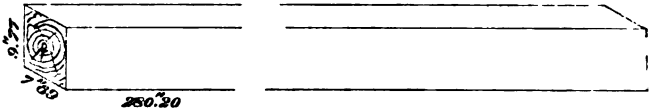
No. 542.

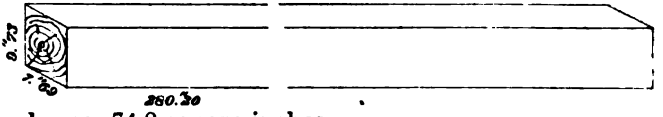


Sectional area, 75.1 square inches.
Gauged length, 200″.
Weight, 501 pounds.
Counterweight at middle, 250 pounds.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflection.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
7,510	100	0.	.....	0.	0.	
37,550	500	.0490	.....	—.01	0.	
.....	100	.....	0.	0.	0.	
75,100	1,000	.1088	.....	—.05	0.	
.....	100	.....	.0010	0.	0.	
112,650	1,500	.1710	.....	—.09	0.	
.....	100	.....	.0030	0.	0.	
150,200	2,000	.2332	.....	—.12	.02	
.....	100	.....	.0053	0.	0.	
160,000	.....	.....	.....	—.15	.03	
170,000	.....	.....	.....	—.17	.04	
180,000	.....	.....	.....	—.20	.05	
190,000	.....	.....	.....	—.24	.06	
200,000	.....	.....	.....	—.30	.08	
210,000	.....	.....	.....	—.38	.10	
220,000	.....	.....	.....	—.61	.12	
225,000	2,996	.....	.....	.....	.....	Ultimate strength.

Failed rapidly by horizontal deflection when the maximum load was reached.

No. 543.



Sectional area, 74.8 square inches.
Gauged length, 200″.
Weight, 501 pounds.
Counterweight at middle, 250 pounds.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
7,480	100	0.	.....	0.	0.	
37,400	500	.0448	.....	.01	.02	
.....	100	.....	—.0005	0.	.01	
74,800	1,000	.1040	.....	.06	.04	
.....	100	.....	0.	0.	.01	
112,200	1,500	.1665	.....	.10	.04	
.....	100	.....	.0020	0.	.01	
149,600	2,000	.2290	.....	.20	.04	
.....	100	.....	.0050	.01	.01	
160,000	.....	.....	.....	.22	.05	
170,000	.....	.....	.....	.26	.05	
180,000	.....	.....	.....	.31	.06	
190,000	.....	.....	.....	.40	.06	
200,000	.....	.....	.....	.50	.07	
210,000	.....	.....	.....	.74	.09	
220,000	.....	.....	.....	1.60	.13	
220,500	2,948	.....	.....	2.10	.13	Ultimate strength

Failed by horizontal deflection.

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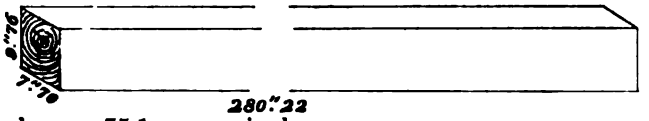
No. 544.

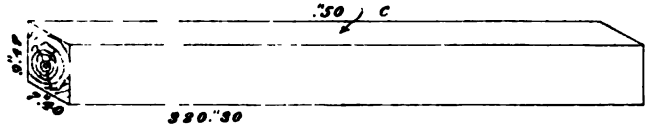


Sectional area, 75.1 square inches.
Gauged length, 200″.
Weight, 560 pounds.
Counterweight at middle, 280 pounds.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
7,510	100	0.	.....	0.	0.	
37,550	500	.0412	.....	0.	— .05	
.....	100	.....	0.	0.	0.	
75,100	1,000	.0900	.....	— .02	— .08	
.....	100	.....	.0004	0.	0.	
112,650	1,500	.1400	.....	— .05	— .11	
.....	100	.....	.0018	0.	0.	
150,200	2,000	.1904	.....	— .06	— .16	
.....	100	.....	.0030	0.	0.	
160,000	.....	.....	.....	— .07	— .16	
170,000	.....	.....	.....	— .07	— .18	
180,000	.....	.....	.....	— .07	— .19	
190,000	.....	.....	.....	— .07	— .20	
200,000	.....	.....	.....	— .07	— .20	
210,000	.....	.....	.....	— .07	— .21	
220,000	.....	.....	.....	— .07	— .22	
230,000	.....	.....	.....	— .07	— .23	
240,000	.....	.....	.....	— .07	— .24	
250,000	.....	.....	.....	— .07	— .25	
260,000	.....	.....	.....	— .07	— .26	
270,000	.....	.....	.....	— .02	— .27	
280,000	.....	.....	.....	+ .02	— .29	
290,000	.....	.....	.....	— .16	— .30	
296,000	3,968	.....	.....	.....	.....	Ultimate strength.

Failed by deflecting sideways.

No. 527.



Sectional area, 70 square inches.
Weight, 531 pounds.
Gauged length, 300″.
Counterweight at middle, 300 pounds.
Initial deflection before stick was dressed down from 8″ × 10″: Vertical, — ″.50.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
7,000	100	0.	.....	0.	0.	
35,000	500	.0625	.....	— .02	— .02	
.....	100	.....	0.	0.	0.	
70,000	1,000	.1428	.....	— .07	— .10	
.....	100	.....	.0068	0.	0.	
105,000	1,500	.2218	.....	— .10	— .16	
.....	100	.....	.0012	0.	0.	
140,000	2,000	.....	.....	— .11	— .23	
210,000	3,000	.....	.....	— .99	— .50	Ultimate strength.

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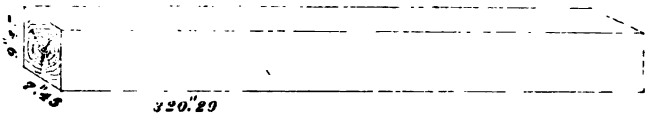
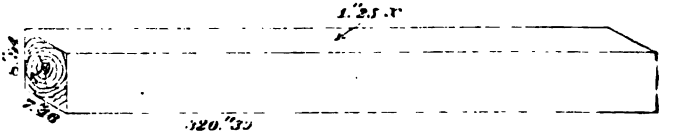
No. 528.



Sectional area, 70.4 square inches.
Weight, 627 pounds.
Counterweight at middle, 300 pounds.
Gauged length, 300″.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
7,140	101	0.	.....	0.	0.	
35,700	507	.0593	.....	−.05	−.03	
.....	101	.....	0.	0.	0.	
71,400	1,014	.1360	.....	−.10	−.09	
.....	101	.....	.0015	0.	0.	
107,100	1,521	.2170	.....	−.18	−.14	
.....	101	.....	.0030	0.	0.	
142,800	2,028	.....	.....	−.30	−.18	
178,500	2,535	.....	.....	−.60	−.25	
205,000	2,912	.....	.....	−2.55	−.40	Ultimate strength.

No. 529.



Sectional area, 66.7 square inches.
Weight, 535 pounds.
Counterweight at middle, 300 pounds.
Gauged length, 300″.
Initial deflection before stick was dressed down from size 8″ × 10″: Vertical, + 1″.25.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
6,670	100	0.	.....	0.	0.	
33,350	500	.0680	.....	.01	0.	
.....	100	.....	0.	0.	0.	
66,700	1,000	.1588	.....	.03	−.09	
.....	100	.....	0.	0.	0.	
100,050	1,500	.2519	.....	.07	−.20	
.....	100	.....	.0020	0.	0.	
133,400	2,000	.....	.....	.08	−.38	
140,000	.....	.....	.....	.08	−.45	
150,000	.....	.....	.....	.10	−.53	
160,000	.....	.....	.....	.11	−.70	
166,750	2,500	.....	.....	.15	−.80	
180,000	.....	.....	.....	.38	−1.15	
184,500	2,766	.....	.....	Ab't 2.20	Ab't −1.50	Ultimate strength.

Failed by deflecting sideways and downward.

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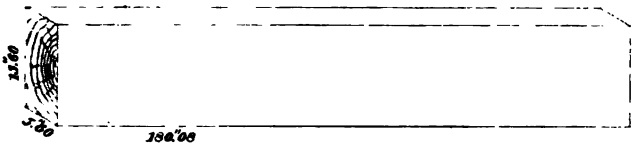
No. 711.

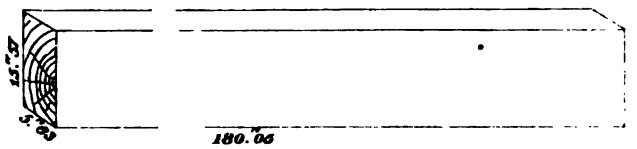


Sectional area, 87.4 square inches.
Gauged length, 150″.
Weight, 375 pounds.
Average rate of growth, 12 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical, W.	Deflections. Vertical, E.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0.	0	0.		0.	0.	0.	
43,700	500	.0491		.03	.01	− .06	
	0		.0004				
80,000				.03	.02		
100,000				.03	.06	− .10	
140,000				.03	.09		
180,000				.03	.10		
200,000				.03	.12	− .12	
220,000				.01	.13		
230,000				.01	.14		
240,000				0.	.14		
250,000				0.	.14		
260,000				0.	.15		
270,000				0.	.15		
280,000				− .01	.15		
290,000				− .01	.16		
300,000				− .02	.16		
310,000				− .05	.17		
320,000				− .07	.19	− .15	
330,000				− .11	.20		
340,000				− .20	.20		
349,000	3,993			− .52	.20		Ultimate strength.

Failed by horizontal deflection, minus direction.

No. 712.



Sectional area, 87.7 square inches.
Ganged length, 150″.
Weight, 397 pounds.
Average rate of growth, 21 rings per inch.
Stick injured by wind-shakes.

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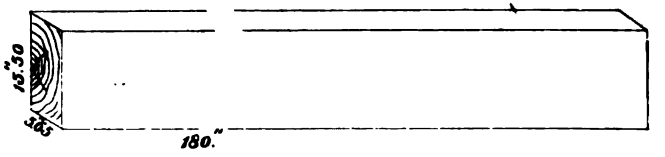
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical, W.	Deflections. Vertical, E.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.	.....	0.	0.	.....	
43,850	500	.0370	.....	0.	.06	.....	
.....	0	.....	0.	.....	.....	.....	
80,000	.....	.....	.....	0.	.08	.....	
100,000	.....	.....	.....	−.01	.10	−.05	
140,000	.....	.....	.....	−.01	.10	.....	
180,000	.....	.....	.....	−.02	.11	.....	
200,000	.....	.....	.....	−.04	.11	−.05	
220,000	.....	.....	.....	−.05	.12	.....	
240,000	.....	.....	.....	−.05	.12	.....	
260,000	.....	.....	.....	−.06	.12	.....	
280,000	.....	.....	.....	−.10	.13	.....	
300,000	.....	.....	.....	−.11	.14	−.07	
310,000	.....	.....	.....	−.17	.14	.....	
320,000	.....	.....	.....	−.24	.15	.....	
330,000	.....	.....	.....	−.33	.15	.....	
339,000	3,865	.....	.....	.....	.....	.....	Ultimate strength.

Failed by horizontal deflection, minus direction.

No. 713.



Sectional area, 87.6 square inches.
Gauged length, 150″.
Weight, 382 pounds.
Average rate of growth, 15 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical, W.	Deflections. Vertical, E.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.	.....	0.	0.	0.	
43,800	500	.0524	.....	−.18	.01	.....	
.....	0	.....	.0006	.....	.....	.....	
80,000	.....	.....	.....	−.15	−.01	.....	
100,000	.....	.....	.....	−.17	−.02	0.	
140,000	.....	.....	.....	−.21	−.02	.....	
180,000	.....	.....	.....	−.28	−.02	.....	
200,000	.....	.....	.....	−.31	−.02	.05	
220,000	.....	.....	.....	−.37	−.02	.....	
240,000	.....	.....	.....	−.43	−.02	.....	
250,000	.....	.....	.....	−.50	−.02	.....	
260,000	.....	.....	.....	−.61	−.04	.....	
270,000	.....	.....	.....	−.98	−.08	.....	
272,500	3,111	.....	.....	−1.17	.....	.....	Ultimate strength.

Failed by horizontal deflection, minus direction.
Fibers crushed at a knot at middle of post.

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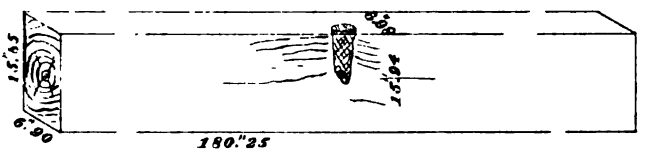
No. 484.



Sectional area, end, 109.4 square inches.
Sectional area, middle, 111.3 square inches.
Gauged length, 160″.
Weight, 432 pounds.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	.....	0.	.....	0.	0.	
50,000	.....	.0380	.....	0.	0.	
10,000	.....	.....	.0005	0.	0.	
100,000	.....	.1080	.....	0.	− .02	
10,000	.....	.....	.0015	0.	0.	
150,000	.....	.1685	.....	+ .02	− .05	
10,000	.....	.....	.0018	0.	0.	
180,000	.....	.2060	.....	.02	− .05	
200,000	.....	.2332	.....	.02	− .05	Slight snapping sounds.
10,000	.....	.....	.0040	0.	0.	
220,000	.....	.2605	.....	.02	− .07	
240,000	.....	.2910	.....	0.	− .10	
260,000	.....	.3270	.....	− .08	− .15	
270,000	2,468	.....	.....	.....	.....	Ultimate strength.

Sustained maximum load about one minute.

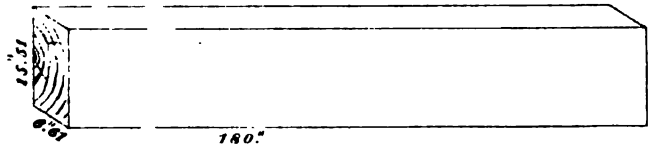
Failed by horizontal deflection. Concave side having large knot near the middle of the post, the heart being 2″ from concave side at one end; opposite end does not have heart in it.

The location of the heart was probably 2″ beyond edge of stick. Post was sawed obliquely with axis of tree running out 4″ in 15 feet; 150 rings of yearly growth in 10″.

Rapid growth during the first years; 6 rings in 1″ at center.

Time of test, one hour.

No. 708.



Sectional area, 102.5 square inches.
Gauged length, 150″.
Weight, 464 pounds.
Average rate of growth, 17 rings per inch.

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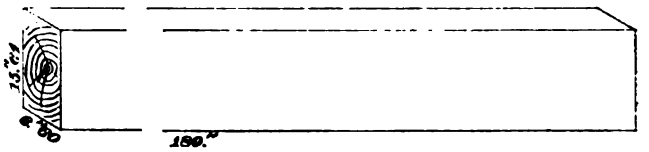
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical, W.	Deflections. Vertical, E.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.	.....	0.	0.	0.	
51,250	500	.0440	.....	— .02	0.	.....	
	0	.....	.0005	.....	.....	.....	
80,000	.....	.....	.....	— .02	0.	.....	
100,000	.....	.....	.....	— .02	0.	.....	
140,000	.....	.....	.....	— .06	.01	.....	
180,000	.....	.....	.....	— .08	.01	.....	
200,000	.....	.....	.....	— .10	.02	— .04	
240,000	.....	.....	.....	— .13	.02	.....	
260,000	.....	.....	.....	— .16	.02	.....	
280,000	.....	.....	.....	— .20	.02	.....	
300,000	.....	.....	.....	— .26	.02	.....	
320,000	.....	.....	.....	— .38	.02	.....	
340,000	3,317	.....	.....	— .60	.08	.....	Ultimate strength.

Failed at some knots at middle of post.

No. 709.



Sectional area, 103.2 square inches.
Gauged length, 150″.
Weight, 557 pounds.
Average rate of growth, 18 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Compression set.	Deflections. Horizontal.	Deflections. Vertical, W.	Deflections. Vertical, E.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.	.....	0.	0.	0.	
51,600	500	.0570	.....	— .05	— .09	— .05	
	0	.....	.0008	.....	.....	.....	
80,000	.....	.....	.....	.05	— .09	.....	
100,000	.....	.....	.....	.05	— .09	.....	
140,000	.....	.....	.....	.04	— .09	.....	
180,000	.....	.....	.....	.03	— .09	.....	
200,000	.....	.....	.....	.02	— .09	.....	
240,000	.....	.....	.....	0.	— .09	.....	
280,000	.....	.....	.....	— .01	— .09	.....	
300,000	.....	.....	.....	— .02	— .09	— .10	
320,000	.....	.....	.....	— .05	— .09	.....	
330,000	.....	.....	.....	— .05	— .09	.....	
340,000	.....	.....	.....	— .06	— .09	.....	
350,000	.....	.....	.....	— .07	— .09	.....	
360,000	.....	.....	.....	— .07	— .09	.....	
370,000	.....	.....	.....	— .08	— .09	.....	
380,000	.....	.....	.....	— .09	— .09	.....	
390,000	.....	.....	.....	— .11	— .10	.....	
400,000	.....	.....	.....	— .13	— .10	— .13	
410,000	.....	.....	.....	— .15	— .10	.....	
420,000	.....	.....	.....	— .18	— .10	.....	
430,000	.....	.....	.....	— .21	— .10	.....	
440,000	.....	.....	.....	— .27	— .10	.....	
450,000	.....	.....	.....	— .40	— .10	.....	
455,000	4,409	.....	.....	— .62	— .10	.....	Ultimate strength.

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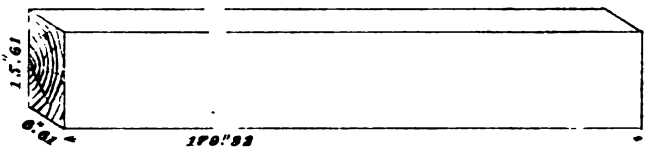
Failed by horizontal deflection, minus direction.

Horizontal deflection increased to —3″.30; fibers of stick crushed at 1″ to 6½″ from end. Grain straight.

No. 710.



Sectional area, 103.2 square inches.
Ganged length, 150″.
Weight, 491 pounds.
Average rate of growth, 18 rings per inch.

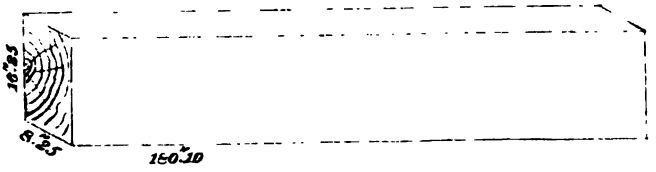
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.			Remarks.
				Horizontal.	Vertical, W.	Vertical, E.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.		0.	0.	0.	
51,600	500	.312		—.06	.02		
	0		0.				
80,000				—.06	.02		
100,000				—.06	.02		
140,000				—.06	.03		
180,000				—.06	.05		
200,000				—.06	.06	0.	
240,000				—.06	.07		
280,000				—.07	.08		
300,000				—.08	.08	—.02	
340,000				—.09	.09		
380,000				—.10	.09		
380,000				—.11	.09		
400,000				—.16	.10	—.05	
420,000				—.26	.10		
430,000				—.37	.11		
432,000	4,186			—.50*			Ultimate strength.

*About.

Failed by horizontal deflection, minus direction.

Horizontal deflection increased to 3″.20, slightly crushing fibers 29″ from south end, where stick appeared weakened by shakes and seam cracks.

No. 641.



Sectional area, 134 square inches.
Weight, 561 pounds.
Ganged length, 150″.
Average rate of growth, 5 rings per inch.

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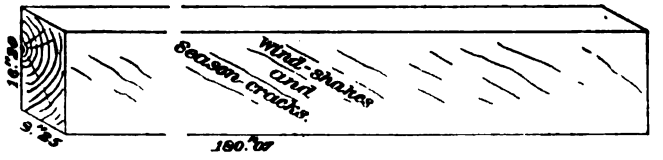
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
13,400	100	0.	.....	0.	0.	
67,000	500	.0380	.....	0.	0.	
107,200	800	.0663	.....	0.	.01	
134,000	1,000	.0851	.....	0.	.01	
.....	100	.....	0.	0.	0.	
150,000	.....	.....	.....	0.	.03	
160,000	.....	.....	.....	0.	.04	
170,000	.....	.....	.....	0.	.05	
180,000	.....	.....	.....	0.	.05	
200,000	.....	.....	.....	0.	.05	
220,000	.....	.....	.....	0.	.05	
240,000	.....	.....	.....	0.	.05	
260,000	.....	.....	.....	0.	.05	
280,000	.....	.....	.....	0.	.06	
300,000	.....	.....	.....	0.	.08	
320,000	.....	.....	.....	0.	.08	
340,000	.....	.....	.....	.01	.09	
360,000	.....	.....	.....	.01	.09	
380,000	.....	.....	.....	.02	.09	
400,000	.....	.....	.....	.04	.09	
410,000	.....	.....	.....	.06	.09	
420,000	.....	.....	.....	.10	.07	
425,000	.....	.....	.....	.13	.05	
428,000	3,194	.....	.....	.18	.02	Ultimate strength.

Failed by crushing fibers at middle and 40″ from end in the vicinity of knots.

No. 671.



Sectional area, 133 square inches.
Gauged length, 150″.
Weight, 585 pounds.
Average rate of growth, 12 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical, W.	Deflections. Vertical, E.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.	.....	0.	0.	0.	
66,800	500	.0612	.....	−.01	0.	0.	
0		.....	.0006	.....	.....	.....	
80,000	.....	.....	.....	−.01	0.	0.	
100,000	.....	.....	.....	−.02	.01	.01	
140,000	.....	.....	.....	−.02	.01	.....	
180,000	.....	.....	.....	−.03	.02	.....	
200,000	.....	.....	.....	−.04	.03	.01	
220,000	.....	.....	.....	−.05	.03	.....	
240,000	.....	.....	.....	−.05	.04	.....	
260,000	.....	.....	.....	−.06	.05	.....	
280,000	.....	.....	.....	−.07	.05	.....	
300,000	.....	.....	.....	−.07	.05	.01	
320,000	.....	.....	.....	−.08	.06	.....	
340,000	.....	.....	.....	−.09	.06	.....	
360,000	.....	.....	.....	−.11	.06	.....	
380,000	.....	.....	.....	−.15	.07	.....	
400,000	.....	.....	.....	−.20	.08	.01	
420,000	.....	.....	.....	−.40	.08	.....	
425,000	3,181	.....	.....	−.88	.08	.....	Ultimate strength.

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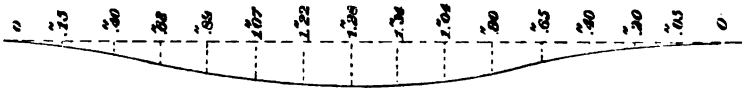
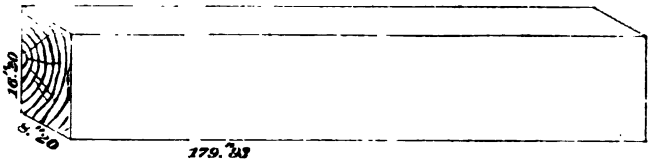
Failed by horizontal deflection, minus direction.

When horizontal deflection had reached about —1″.35, a chalk-line was laid off on stick and ordinates measured every 12″, showing the curve of flexure as per the following sketch:



No. 672.



Sectional area, 132.8 square inches.
Gauged length, 150″.
Weight, 578 pounds.
Average rate of growth, 13 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.			Remarks.
				Horizontal.	Vertical, W.	Vertical, E.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.		0.	0.	0.	
66,400	500	.0535		— .01	0.		
0	0		0.				
80,000				— .01	0.		
100,000				— .01	0.		
140,000				— .01	0.		
180,000				— .01	0.		
200,000				— .01	0.	— .02	
240,000				— .01	0.		
260,000				— .01	0.		
280,000				— .02	0.		
300,000				— .03	0.	— .04	
320,000				— .03	0.		
340,000				— .03	0.		
360,000				— .03	0.		
380,000				— .03	0.		
400,000				— .04	— .01	— .07	
410,000				— .05	— .01		
420,000				— .05	— .02		
430,000				— .05	— .02		
440,000				— .05	— .03		
450,000				— .05	— .03		
460,000				— .05	— .03		
470,000				— .05	— .05		
480,000				— .05	— .06		
490,000				— .04	— .07		
500,000				— .03	— .09	— .17	
510,000				— .01	— .11		
520,000				+ .01	— .15		
526,000	3,961			.25	— .20		Ultimate strength.

Failed by horizontal deflection, plus direction.

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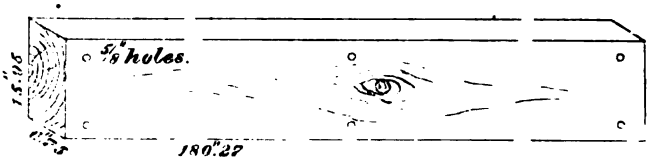
No. 485.

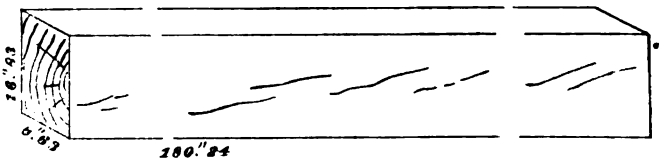


Sectional area, 107.7 square inches.
Weight, 434 pounds.
This stick taken from built post No. 691, which was tested March 11, 1881. It failed at the knot near middle in the original test, under 3,070 pounds per square inch compression.
The test was discontinued soon as the maximum load was passed, and the stick placed in the storehouse to season. Allowed to season thirteen months and then tested.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000				0.	0.	
50,000				.05	.02	
100,000				.40	0.	
120,000				.62	0.	
120,000				.70	0.	Sustained load 5 minutes.
130,000				.80	0.	
130,000				.90	0.	Sustained load 5 minutes.
140,000				.92	0.	
140,000				1.00	0.	Sustained load 3 minutes.
150,000				1.10	0.	
150,000				1.23	0.	Sustained load 5 minutes.
160,000				1.35	0.	
160,000				1.50	0.	Sustained load 5 minutes.
165,000				1.56	0.	
170,000				1.70	0.	
175,000	1,625			1.90		Ultimate strength.

Sustained maximum load momentarily.
Failed by horizontal deflection; concave on the side having the knot.
Fibers crushed at middle knot and opened longitudinal crack.
Time of test three-quarters of an hour.

No. 486.



Sectional area, 145.2 square inches.
Gauged length, 160″.
Weight, 705 pounds.
Second test of post No. 714. Ultimate strength found by the first test, 456,000 pounds=3,180 pounds per square inch.
Rested in storehouse thirteen months, and again tested.
Grain of specimen oblique to axis.
Post free from knots.

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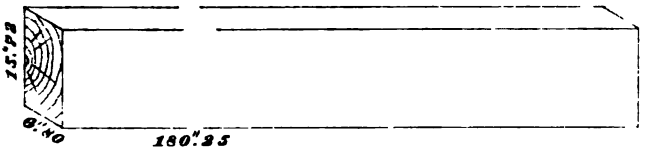
Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	.....	0.	.....	0.	0.	
50,000	.....	.0265	.....	0.	+.02	
10,000	.....	.....	0.	0.	0.	
100,000	.....	.0640	.....	0.	.10	
10,000	.....	.....	.0010	0.	0.	
200,000	.....	.1520	.....	0.	.25	Snapping sounds heard.
10,000	.....	.....	.0080	0.	0.	
220,000	.....	.....	.....	0.	.30	
240,000	.....	.....	.....	0.	.30	
260,000	.....	.....	.....	0.	.35	
280,000	.....	.....	.....	0.	.40	
300,000	.....	.....	.....	0.	.46	
300,000	.....	.....	.....	0.	.50	Sustained load 5 minutes.
320,000	.....	.....	.....	0.	.55	
340,000	.....	.....	.....	0.	.65	
340,000	.....	.....	.....	0.	.70	Sustained load 3 minutes.
360,000	.....	.....	.....	0.	.75	
380,000	2,617	.....	.....	0.	.85	Ultimate strength.

Sustained maximum load momentarily, then opened cracks rapidly as the pressure was gradually allowed to fall.

The longitudinal cracks were oblique with axis of post at an angle of about 5°.

The development of the cracks began at 200,000 pounds.

No. 487.



Sectional area, 106.9 square inches.

Gauged length, 160″.

Weight, 450 pounds.

Initial bend, ″.44; 1 sine.

Post free from knots.

This post was tested March 11, 1881, at that time sustaining 317,000 pounds = 2,795 pounds per square inch.

Second test made after rest of thirteen months nine days.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections. Horizontal.	Deflections. Vertical.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	.....	0.	.....	0.	0.	
50,000	.....	.0282	.....	0.	0.	
10,000	.....	.....	0.	0.	0.	
100,000	.....	.0690	.....	−.10	0.	
10,000	.....	.....	.0015	0.	0.	
150,000	.....	.1120	.....	−.20	0.	
10,000	.....	.....	.0040	−.04	0.	
200,000	.....	.1600	.....	−.30	.05	
10,000	.....	.....	.0080	−.07	0.	
220,000	.....	.....	.....	−.40	.10	
240,000	.....	.....	.....	−.48	.15	
240,000	.....	.....	.....	−.50	.15	Sustained load 5 minutes.
260,000	.....	.....	.....	−.60	.15	
270,000	.....	.....	.....	−.65	.15	
280,000	.....	.....	.....	−.72	.20	
290,000	.....	.....	.....	−.80	.20	
300,000	.....	.....	.....	−.90	.20	
305,000	.....	.....	.....	−1.05	.20	
305,000	.....	.....	.....	−1.25	.25	Sustained load 5 minutes.
310,000	2,900	.....	.....	.....	.....	Ultimate strength.

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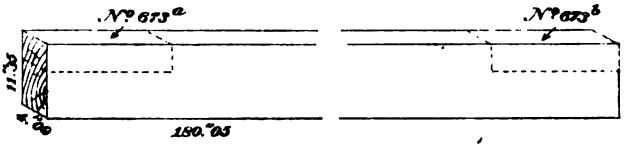
Sustained maximum load about five minutes, yielding laterally in the mean time, following the direction of the initial bend; convex on heart-side of post.

Time of test three-quarters of an hour.

COMPRESSION TESTS OF YELLOW PINE—(Continued).

SINGLE STICKS AND BUILT POSTS.

No. 673.



Sectional area, 46.4 square inches.
Gauged length, 150″.
Weight, 260 pounds.
Average rate of growth, 11 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Compression set.	Deflections. Horizontal.	Deflections. Vertical, W.	Deflections. Vertical. E.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.	0.	0.	0.	0.	North end of stick very resinous.
23,200	500	.0370		— .01	0.		
0	0		.0028				
30,000				— .01	0.		
40,000				— .01	.01		
50,000				— .01	.02	— .04	
60,000				— .01	.03		
70,000				— .01	.06		
80,000				— .01	.07		
90,000				— .03	.09		
100,000				— .05	.10	— .08	
110,000				— .09	.11		
120,000				— .13	.12		
130,000				— .22	.13		
140,000				— .50	.13		
142,200	3,065			— .95			Ultimate strength.
Failed by horizontal deflection, minus direction.							
120,000	2,586			—2.50			Sudden deflection increasing —5″.

Specimen No. 673*a*, 20″ long, cut from north end of stick.
Specimen No. 673*b*, 20″ long, cut from south end of stick.

Specimen.	Weight.	Size.	Sectional area.	Ultimate strength. Actual.	Ultimate strength. Pounds per square inch.	Remarks.
	Pounds.	*Inches.*	*Sq. inches.*	*Pounds.*		
673*a*	13	4.01 × 4.01	16.08	94,000	5,846	Fibers crushed.
673*b*	7¼	3.95 × 3.97	15.68	99,600	6,352	Fibers crushed: small rent in specimen at corner not affecting over 5 per cent. of sectional area of stick.

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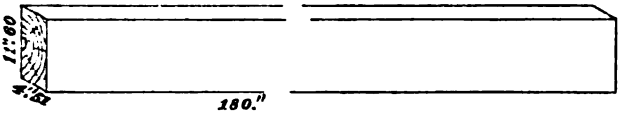
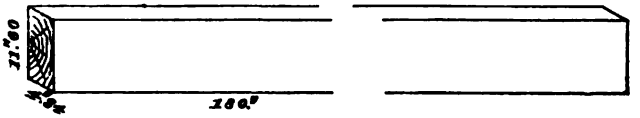
No. 674.



Sectional area, 52.3 square inches.
Gauged length, 150″.
Weight, 233 pounds.
Average rate of growth, 17 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Compression set.	Deflections.			Remarks.
				Horizontal.	Vertical, W.	Vertical, E.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.	0.	0.	0.	0.	
26,150	500	.0492	.....	— .07	— .03	— .04	
.....	0	.....	.0003	.....	.....	.....	
30,000	.....	.....	.....	— .09	— .03	.....	
40,000	.....	.....	.....	— .10	— .03	.....	
50,000	.....	.....	.....	— .11	— .03	.....	
60,000	.....	.....	.....	— .14	— .04	.....	
70,000	.....	.....	.....	— .17	— .05	.....	
80,000	.....	.....	.....	— .20	— .06	.....	
90,000	.....	.....	.....	— .25	— .07	.....	
100,000	.....	.....	.....	— .32	— .08	— .06	
110,000	.....	.....	.....	— .41	— .09	.....	
120,000	.....	.....	.....	— .58	— .09	.....	
130,000	.....	.....	.....	—1.00	— .10	.....	
131,500	2,515	.....	.....	—1.30	— .12	.....	Ultimate strength.
Failed by horizontal deflection, minus direction.							
110,000	.....	.....	.....	—3.30	.....	.....	Sudden spring, increasing horizontal deflection to — 5″.

No. 675.



Sectional area, 50.3 square inches.
Gauged length, 150″.
Weight, 194 pounds.
Average rate of growth, 22 rings per inch.

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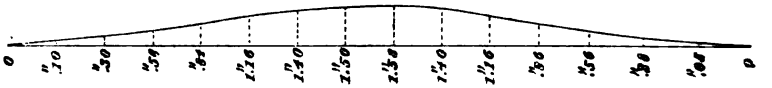
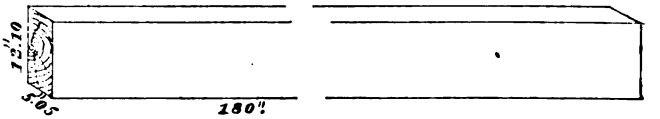
Loads applied.	Pounds per square inch.	Compression.	Compression set.	Deflections. Horizontal.	Deflections. Vertical, W.	Deflections. Vertical, E.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.	.....	0.	0.	0.	
25,150	500	.0490	.....	.01	0.	.....	
.....	0	.....	.0006	.....	.....	.....	
30,000	.....	.....	.....	.02	0,	.....	
40,000	.....	.....	.....	.02	0.	.....	
50,000	.....	.....	.....	.03	0.	.01	
60,000	.....	.....	.....	.04	— .01	.....	
70,000	.....	.....	.....	.05	— .02	.....	
80,000	.....	.....	.....	.07	— .02	.....	
90,000	.....	.....	.....	.10	— .03	.....	
100,000	.....	.....	.....	.15	— .03	.05	
110,000	.....	.....	.....	.24	— .04	.....	
120,000	.....	.....	.....	.65	— .05	.....	
121,200	2,410	.....	.....	.90	— .05	.....	Ultimate strength.

Failed by horizontal deflection, minus direction.

Sketch showing of flexure, ordinates measured every 12″.



No. 490.



Sectional area, 61.1 square inches.
Weight, 269 pounds.
Gauged length, 160″.
Post free from knots.

Loads applied.	Pounds per square inch.	Compression.	Compression set.	Deflections. Horizontal.	Deflections. Vertical, W.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000	.....	0.	0.	0.	0.	
20,000	.....	.0140	.....	0.	0.	
40,000	.....	.0416	.....	— .01	0.	
50,000	.....	.0570	.....	— .02	0.	
10,000	.....	.....	.0010	0.	0.	
60,000	.....	.0708	.....	— .02	0.	
80,000	.....	.0995	.....	— .02	0.	
100,000	.....	.1318	.....	— .03	0.	
10,000	.....	.....	.0035	0.	0.	
120,000	.....	.1615	.....	— .04	0.	
140,000	.....	.1900	.....	— .04	0.	Snapping sound heard; sliver starting off at edge.
150,000	.....	.2070	.....	— .05	0.	
10,000	.....	.....	.0060	.....	.....	Rested 2 minutes
10,000	.....	.....	.0050	.....	.....	Rested 5 minutes.
10,000	.....	.....	.0040	.....	.....	
160,000	.....	.2220	.....	— .05	0.	
180,000	.....	.2524	.....	— .05	0.	
200,000	.....	.2873	.....	— .05	0.	
10,000	.....	.....	.0098	0.	0.	
230,000	3,764	.....	.....	+ .01	0.	Ultimate strength
230,000	.....	.....	.....	+1.30	0.	After sustaining load 4 minutes.
230,000	.....	.....	.....	+1.80	0.	Maximum deflection.
10,000	.....	.....	.....	+ .40	0.	

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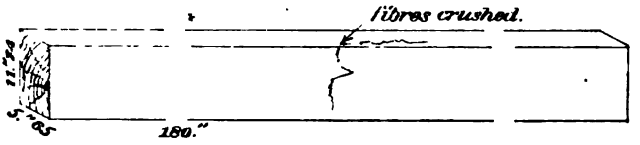
Time of test, one hour.
Failed by horizontal deflection.
Deflections changed in direction horizontally when the maximum load was reached.
Failing finally by bending concave on the heart-side of the post.

No. 670.

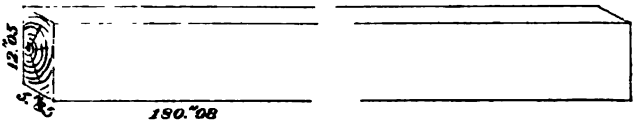


Sectional area, 66.3 square inches.
Gauged length, 150".
Weight, 309 pounds.
Average rate of growth, 12 rings per inch.

Loads applied.	Pounds per square inch.	Compression.	Compression set.	Deflections. Horizontal.	Deflections. Vertical, W.	Deflections. Vertical, E.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	
0	0	0.	.....	0.	0.	0.	
33,150	500	.0455	.....	0.	— .04	.....	
0	0	.....	.0005	.....	.....	.....	
50,000	.....	.....	.....	— .01	— .06	.....	
70,000	.....	.....	.....	— .02	— .09	.....	
90,000	.....	.....	.....	— .02	— .11	.....	
100,000	.....	.....	.....	— .02	— .11	.10	
120,000	.....	.....	.....	0.	— .15	.....	
140,000	.....	.....	.....	.02	— .18	.....	
150,000	.....	.....	.....	.04	— .20	.15	
160,000	.....	.....	.....	.07	— .20	.....	
170,000	.....	.....	.....	.10	— .21	.....	
180,000	.....	.....	.....	.13	— .23	.....	
190,000	.....	.....	.....	.18	— .25	.....	
200,000	.....	.....	.....	.31	— .28	.23	
205,900	3,106	.....	.....	.70	— .29	.....	Ultimate strength.

Failed by horizontal deflection, plus direction.
Fibers crushed near middle of stick, line of failure taking an oblique course.

No. 489.



Sectional area, 70.5 square inches.
Weight, 287 pounds.
Gauged length, 160".
Post free from knots.

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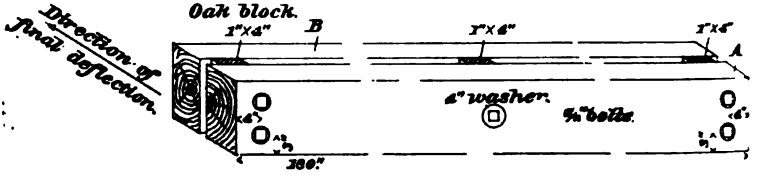
Loads applied.	Pounds square per inch.	Compression.	Compression set.	Deflections. Horizontal.	Deflections. Vertical, W.	Remarks.
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000		0.	0.	0.	0.	
20,000		.0114		0.	0.	
40,000		.0368		—.01	0.	
50,000		.0405		—.02	0.	
10,000			0.	0.	0.	
60,000		.0630		—.02	0.	
80,000		.0895		—.04	0.	
100,000		.1162		—.04	0.	
10,000			.0004	0.	0.	
120,000		.1435		—.08	0.	
140,000		.1710		—.10	0.	
150,000		.1850		—.10	0.	
10,000			.0025	0.	0.	
160,000		.1980		—.12	0.	[minutes.
160,000		.2008		—.12	0.	Sustained load 5
160,000		.2020		—.12	0.	Sustained load 10 minutes.
170,000		.2160		—.15	0.	
180,000		.2295		—.18	0.	
180,000		.2310		—.20	0.	
190,000		.2450		—.20	0.	
200,000		.2585		—.21	0.	
10,000			.0082	—.01	0.	
10,000			.0060	—.01	0.	After 5 minutes rest.
210,000				—.27	0.	
220,000				—.31	0.	
230,000				—.38	0.	
240,000				—.50	0.	
250,000	3,546			—.73	0.	Ultimate strength.
250,000				—1.26		Sustained load 5 minutes.

Failed by horizontal deflection; convex on heart-side of post. After sustaining load five minutes, horizontal deflection increased rapidly, opening longitudinal cracks along middle of post near the heart of the wood.

Time of test one and a half hours.

No. 654.



Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Ganged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	326	11	180	5.63	11.71	65.9	150
B	290	6	180	5.62	11.71	65.9	150
	616					131.8	

Stick.	Loads applied. Actual.	Loads applied. Pounds per sq. inch.	Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Pounds		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	32,950	500	.0418	.0002	.03	0.
B	32,950	500	.0540	0.	0.	0.

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Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	0.	
20,000	0.	0.	0.	
40,000	0.	0.	0.	
80,000	0.	0.	0.	
100,000	0.	0.	0.	
140,000	0.	.01	— .01	
180,000	0.	.02	— .02	
200,000	0.	.02	— .02	
220,000	0.	.03	— .03	
240,000	0.	.04	— .03	
260,000	0.	.05	— .03	
280,000	.01	.07	— .04	
300,000	.01	.08	— .04	
320,000	.03	.09	— .04	
340,000	.04	.10	— .04	
360,000	.05	.11	— .04	
380,000	.07	.12	— .04	
400,000	.10	.14	— .04	
410,000	.11	.15	— .04	
420,000	.12	.16	— .04	
430,000	.14	.16	— .04	
440,000	.20	.18	— .04	
450,000	.23	.20	— .04	
460,000	.29	.22	— .04	
470,000	.39	.22	— .04	Ultimate strength = 3,566 pounds per square inch.

Failed by horizontal deflection, plus direction.

No. 655.

Same style of post as No. 654.

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	292	24	179.93	5.64	11.72	66.1	150
B	329	24	179.93	5.63	11.72	66.1	150
	621					132.2	

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per sq. inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	33,050	500	.0292	0.	.03	0.
B	33,050	500	.0315	.0007	0.	0.

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Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	0.	
20,000	0.	0.	0.	Sticks straight-grained, free from knots.
40,000	0.	0.	0.	
80,000	0.	.01	—.01	
100,000	0.	.02	—.01	
140,000	0.	.02	—.01	
180,000	0.	.01	—.01	
200,000	0.	.01	—.01	
240,000	0.	.01	—.01	
280,000	0.	.01	—.01	
300,000	0.	.01	—.01	
320,000	0.	.01	—.01	
340,000	0.	0.	0.	
350,000	0.	0.	0.	
360,000	0.	0.	0.	
370,000	0.	0.	0.	
380,000	0.	0.	0.	
390,000	0.	0.	0.	
400,000	0.	0.	0.	
410,000	0.	0.	0.	
420,000	0.	—.01	.01	
430,000	—.01	—.01	.01	
440,000	—.01	—.01	.01	
450,000	—.01	—.01	.01	
460,000	—.01	—.01	.01	
470,000	—.01	—.01	.01	
480,000	—.01	—.01	.01	
490,000	—.01	—.01	.01	
500,000	—.01	—.01	.01	
510,000	0.	—.02	.02	
520,000	0.	—.03	.03	
530,000	.01	—.04	.04	
540,000	.02	—.05	.05	
550,000	.05	—.06	.....	
560,000	.10	—.08	.....	
570,000	.17	—.09	.....	
580,000	.....	.....	.....	Ultimate strength = 4,387 pounds per square inch.
Failed by horizontal deflection in plus direction. Loads continued after passing the ultimate strength, increasing the horizontal deflection.				
527,000	1.30	Maximum load now sustained.		
10,000	.....	Rested 36 hours.		
7,500	.....	Load on post at end of 36 hours.		
509,000	1.40	Maximum load sustained after 36 hours' rest.		

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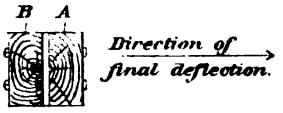
No. 656.

Same style of post as No. 654.



Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	282	13	180	5.61	11.71	65.7	150
B	287	11	180	5.61	11.71	65.7	150
	569	.....	.....	.....	.....	131.4	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	32,850	500	.0868	.0002	−.02	0.
B	32,850	509	.0466	.0008	−.06	0.

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	0.	
20,000	0.	0.	0.	
40,000	0.	+.01	−.01	
80,000	0.	+.01	−.01	
100,000	0.	.02	0.	
140,000	−.01	.02	0.	
180,000	−.04	.01	0.	
200,000	−.04	.01	0.	
220,000	−.05	.01	0.	
240,000	−.06	0.	.01	
260,000	−.06	0.	.01	
280,000	−.07	0.	.01	
300,000	−.07	−.01	.02	
320,000	−.08	−.01	.02	
340,000	−.09	−.01	.02	
360,000	−.10	−.01	.02	
380,000	−.11	−.01	.02	
400,000	−.12	−.02	.....	
420,000	−.16	−.02	.....	
440,000	−.21	−.04	+.04	
460,000	−.27	−.04	+.04	
480,000	−.33	−.04	+.04	
470,000	−.52	−.04	+.04	
480,000	−.65	−.04	+.04	Ultimate strength = 3,653 pounds per square inch.

Failed by horizontal deflection, minus direction.

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No. 651.

YELLOW PINE, SWELLED POSTS.

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	262	11	180	5.58	11.71	65.3	150
B	275	7	180	5.58	11.71	65.3	150
	537	.....	.....	.....	.....	130.6	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	32,650	500	.0620	.0014	−.19	−.02
B	32,650	500	.0514	.0008	.13	0.

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	.....	
20,000	0.	0.	.....	
40,000	0.	0.	.....	
60,000	0.	0.	.....	
80,000	0.	0.	.....	
100,000	0.	0.	.....	
120,000	0.	0.	.....	
140,000	0.	0.	.....	
160,000	0.	0.	.....	
180,000	0.	0.	.....	
200,000	0.	0.	.....	
220,000	0.	−.01	+.02	
240,000	0.	−.02	+.04	
260,000	0.	−.03	.05	
280,000	0.	−.04	.05	
300,000	0.	−.05	.06	
320,000	0.	−.07	.07	
340,000	0.	−.09	.09	
360,000	.07	−.11	.11	Ultimate strength = 2,756 pounds per square inch.
360,000	.47	−.17	.....	After sustaining load 5 minutes.

Post failed by horizontal deflection in plus direction.

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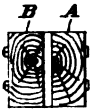
No. 652.

Same style of post as No. 651.



Direction of final deflection.

1" spaces at ends.
1½" space at middle.

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Ganged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	310	16	180	5.58	11.70	65.3	150
B	370	16	180	5.58	11.71	65.3	150
	680	.....	.....	.....	.....	130.6	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	32,650	500	.0395	.0008	—.20	0.
B	32,650	500	.0360	.0002	.18	.03

Transversely the sticks bend an equal amount when bolted together.

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	0.	Sticks A and B straight grained and free from knots.
20,000	0.	0.	0.	
40,000	0.	—.01	—.01	
60,000	0.	—.01	—.01	
80,000	0.	—.01	—.01	
100,000	0.	—.01	—.01	
140,000	0.	0.	0.	
180,000	0.	0.	0.	
200,000	0.	0.	0.	
220,000	0.	0.	0.	
240,000	0.	0.	0.	
260,000	0.	—.01	+.01	
280,000	0.	—.01	.01	
300,000	0.	—.01	.01	
320,000	0.	—.01	.01	
340,000	0.	—.01	.01	
360,000	0.	—.02	.02	
380,000	0.	—.02	.02	
400,000	0.	—.02	.02	
410,000	0.	—.03	.03	
420,000	0.	—.04	.04	
430,000	0.	—.04	.04	
440,000	0.	—.04	.04	

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Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
450,000	0.	— .05	.05	
460,000	0.	— .05	.05	
470,000	0.	— .05	.05	
480,060	0.	— .05	.05	
490,000	0.	— .05	.05	
500,000	0.	— .05	.05	
510,000	0.	— .05	.05	
520,000	0.	— .05	.05	
530,000	0.	— .05	.05	
540,000	0.	— .05	.05	
550,000	0.	— .06	.05	
560,000	— .01	— .06	.05	
570,000	— .02	— .06	.05	
580,000	— .09	— .06	.05	
585,000	— .17	— .06	.05	
588,500	— .36	— .06	.05	Ultimate strength = 4,506 pounds per square inch.

Failed by horizontal deflection in minus direction.

No. 653.

Same style of post as No. 651.

1" spaces at ends.
1¼" space at middle.

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	310	16	180	5.63	11.71	65.9	150
B	311	12	180	5.59	11.68	65.3	150
	621	.....	.....	.....	.....	131.2	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	32,950	500	.0559	.0008	— .26	— .01
B	32,650	500	.0550	0.	— .12	.02

Transversely the sticks bend an equal amount when bolted together.

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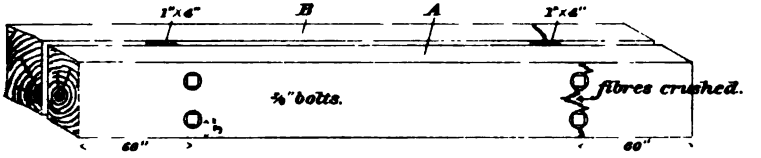
Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	0.	
20,000	0.	.01	0.	
40,000	0.	.01	0.	
80,000	0.	.02	0.	
100,000	.01	.02	0.	
140,000	.01	.02	0.	
160,000	.01	.02	0.	
180,000	.01	.02	0.	
200,000	.02	.02	0.	
220,000	.02	.02	0.	
240,000	.02	.02	0.	
260,000	.03	.01	0.	
280,000	.05	.01	0.	
300,000	.05	.01	0.	
320,000	.06	.01	0.	
340,000	.09	.01	0.	
360,000	.10	.01	0.	
370,000	.11	.01	0.	
390,000	.14	.01	0.	
400,000	.16	.01	0.	
410,000	.20	.01	0.	
420,000	.28	.01	0.	
430,000	.40	.01	0.	
436,600	.60	.01	0.	Ultmate strength = 3,328 pounds per square inch.

Stick B failed 32″ from middle, fibers crushing at a group of knots. Post took horizontal deflection in plus direction.

No. 657.



Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	340	9	179.96	5.63	11.72	66.0	150
B	319	13	179.96	5.64	11.71	66.0	150
	659	.....	.....	.....	.....	132.0	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	33,000	500	.0375	0.	— .05	— .01
B	33,000	500	.0305	0.	— .02	0.

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Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	0.	
20,000	0.	.01	0.	
40,000	0.	.02	.....	
80,000	0.	.04	.04	
100,000	0.	.06	.....	
140,000	0.	.10	.....	
180,000	0.	.12	.....	
200,000	0.	.14	.10	
220,000	0.	.15	.....	
240,000	0.	.16	.....	
260,000	0.	.18	.....	
280,000	0.	.20	.....	
300,000	0.	.21	.12	
320,000	0.	.23	.....	
340,000	0.	.25	.....	
360,000	0.	.27	.....	
380,000	0.	.29	.....	
400,000	0.	.31	.....	
420,000	0.	.32	.15	
440,000	0.	.35	.....	
460,000	0.	.37	.....	
480,000	0.	.40	.....	
500,000	0.	.42	.....	
520,000	0.	.47	.....	
540,000	0.	.50	.....	
560,000	— .02	.57	.....	
580,000	— .09	.65	.....	Ultimate strength = 4,394 pounds per square inch.

Failed by crushing fibers at bolt-holes.

No. 658.

Same style of post as No. 657.

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	319	12	179.98	5.59	11.71	65.5	150
B	332	9	179.98	5.59	11.72	65.5	150
	651	.....	.....	.....	.....	131.0	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	32,750	500	.0320	.0065	.08	0.
B	32,750	500	.0436	.0008	— .04	0.

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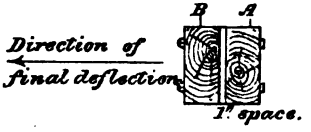
Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	0.	Sticks in poor condition; contain bad shakes and season-cracks. Oblique to axis of sticks.
20,000	0.	0.	.....	
40,000	.02	.07	— .07	
80,000	.02	.12	.....	
100,000	0.	.15	.....	
140,000	0.	.20	.....	
180,000	0.	.25	.....	
200,000	— .01	.28	— .28	
220,000	— .02	.30	.....	
240,000	— .04	.32	.....	
260,000	— .05	.33	.....	
280,000	— .06	.35	.....	
300,000	— .08	.35	— .20	
320,000	— .10	.35	.....	
340,000	— .12	.35	.....	
360,000	— .15	.35	.....	
380,000	— .17	.35	.....	
400,000	— .21	.33	— .07	
410,000	— .27	.25	0.	
420,000	— .30	.15	.....	
425,000	— .41	— .10	+ .55	
430,000	— .48	— .12	.....	
440,000	— .58	— .27	.....	
445,000	— .75	— .41	.....	
448,000	—1.00	— .60	.....	Ultimate strength = 3,420 pounds per square inch.

Stick B failed by opening oblique season-cracks, and shakes taking a minus horizontal deflection.

No. 659.

Same style of post as No. 657.



Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	320	12	180	5.61	11.73	65.8	150
B	293	8	180	5.61	11.73	65.8	150
	613	.....	.....	.....	.....	131.6	.....

Stick.	Loads applied.		Compression.	Compression. set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	32,900	500	.0312	0.	.04	0.
B	32,900	500	.0372	.0002	— .01	0.

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Test of the built post.

Loads applied.	Deflections. Horizontal.	Vertical, W.	Vertical, E.	Remarks.
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	0.	
20,000	0.	0.	.....	
40,000	0.	0.	.....	
80,000	0.	0.	.....	
100,000	0.	0.	.....	
140,000	0.	0.	.....	
180,000	0.	0.	.....	
200,000	0.	—.02	.13	
220,000	.01	—.03	.....	
240,000	.02	—.03	.15	
260,000	.03	—.04	.....	
280,000	.03	—.05	.....	
300,000	.04	—.05	.20	
320,000	.05	—.05	.....	
340,000	.06	—.06	.....	
360,000	.07	—.07	.....	
380,000	.08	—.08	.....	
400,000	.10	—.09	.27	
440,000	.12	—.09	.....	
480,000	.15	—.09	.35	
500,000	.17	—.08	.....	
520,000	.20	—.07	.....	
540,000	.24	—.07	.....	
560,000	.30	—.04	.....	
580,000	.45	—.03	.....	
600,000	.70	0.	.47	Ultimate strength = 4,559 pounds per square inch.

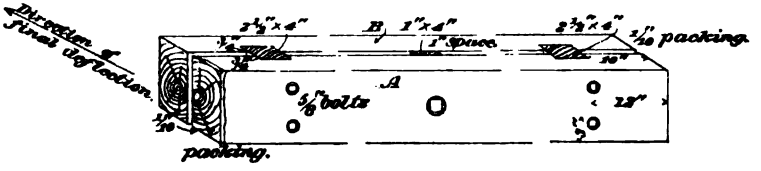
Failed by horizontal deflection, plus direction.

Deflection increased to 1″.40 horizontal without crushing fibers of either stick.

YELLOW PINE, BUILT POSTS.

End packing blocks let into sticks.

No. 660.



Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	283	25	180.03	5.61	11.22	62.9	150
B	294	18	180.03	5.63	11.24	63.3	150
	577	.....	.....	.....	.....	126.2	.....

Stick.	Loads applied. Actual.	Pounds per square inch.	Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	31,450	500	.0325	0.	.08	0.
B	31,650	500	.0400	0.	0.	0.

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Test of the built post.

Tested with uneven bearings.

Strips of yellow-pine packing $\frac{1}{10}$″ thick placed between ends of sticks and compression platform, one strip behind end of stick A, and one strip behind opposite end of stick B.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.				
10,000	0.	0.	0.	
20,000	0.	.01	.....	
40,000	0.	.02	.....	Ends not packed came to full bearing.
60,000	0.	.03	.....	
80,000	0.	.03	.....	
100,000	0.	.04	— .02	
140,000	0.	.04	.....	
180,000	.01	.05	.....	
200,000	.01	.05	.....	
240,000	.02	.05	.....	
280,000	.03	.06	.....	
300,000	.03	.06	— .03	
320,000	.03	.06	.....	
360,000	.03	.06	.....	
400,000	.05	.06	.....	
420,000	.06	.07	.....	
440,000	.09	.07	.....	
460,000	.10	.07	.....	
480,000	.15	.07	.....	
500,000	.21	.07	— .05	
510,000	.80	0.	.....	Ultimate strength = 4,041 pounds per square inch.

Failed by horizontal deflection, plus direction.

The deflection was increased to 2″.40 horizontal. At this time the fibers of the sticks had crushed at middle and where the packing pieces were notched in near the ends.

No. 661.

Same style of post as No. 660.

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	274	12	180	5.66	11.70	66.2	150
B	310	9	180	5.60	11.72	65.6	150
	584	.....	.....	.....	.....	131.8	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	33,100	500	.0410	0.	— .01	0.
B	32,800	500	.0365	0.	— .03	0.

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Test of the built post.

Tested with uneven bearings.

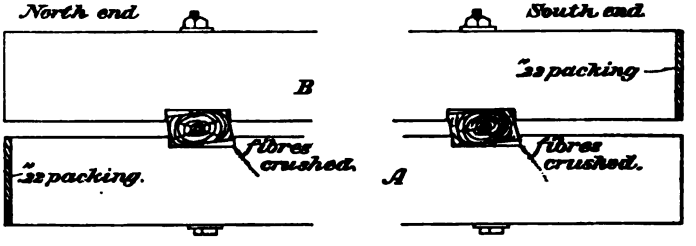
Strip of yellow pine ".22 thick placed behind north ends of stick A; same thickness of packing placed behind south end of stick B.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	0.	
20,000	— .01	0.	.....	
30,000	— .08	.04	.....	Deflection rods readjusted.
	0.	0.	0.	
40,000	— .07	.10	.....	
45,000	.....	.....	.....	Ends not packed reach full bearing.
50,000	— .14	.14	.....	
60,000	— .10	.14	— .04	
80,000	— .10	.14	.....	
100,000	— .10	.14	.....	
140,000	— .04	.15	.....	
180,000	— .01	.15	.....	
200,000	0.	.15	— .05	
220,000	0.	.15	.....	
240,000	0.	.15	.....	
260,000	0.	.15	.....	
280,000	+ .01	.14	.....	
300,000	.03	.14	.....	
320,000	.06	.13	.....	
340,000	.09	.13	.....	
360,000	.12	.13	.....	
380,000	.20	.13	.....	
400,000	.40	.15	+ .07	
410,000	.76	.17	.....	Ultimate strength = 3,111 pounds per square inch.

Failed by horizontal deflection, plus direction.

Deflections were increased after the maximum load was passed to develop lines of failure by crushing the fibers of the sticks.

Fibers of stick A crushed 15" from middle and at notched ends, as shown by sketches below:



No. 662.

Same style of post as No. 660.

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Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	292	14	180	5.61	11.75	65.9	150
B	280	8	180	5.61	11.75	65.9	150
	572	.....	.....	.....	.....	131.8	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch*	*Inch.*
A	32,950	500	.0540	0.	+ .10	0.
B	32,950	500	.0500	.0004	— .09	0.

Test of the built post.

Yellow-pine strips, ".32 thick, placed behind north end of stick A; same amount of packing placed behind south end of stick B.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
10,000	0.	0.	0.	
20,000	— .03	— .01	.....	
30,000	— .08	— .04	.07	Washers of end bolts are drawn into the wood about $\frac{1}{16}$". South end of stick A takes a bearing. North end of stick B takes a bearing.
40,000	— .11	— .08	.....	
50,000	— .06	— .06	.....	
60,000	— .02	— .05	.....	
70,000	— .01	— .05	.....	
80,000	— .01	— .05	.....	
90,000	— .01	— .05	.....	
100,000	— .01	— .05	.08	
120,000	— .04	— .02	.....	
140,000	— .05	— .01	.....	
160,000	— .07	— .01	.....	
180,000	— .08	0.	.....	
200,000	— .10	0.	.05	
220,000	— .11	0.	.....	
240,000	— .12	0.	.....	
260,000	— .13	0.	.....	
280,000	— .15	0.	.....	
300,000	— .19	0.	.05	
320,000	— .21	0.	.....	
340,000	— .29	0.	.....	
360,000	— .37	0.	.....	
380,000	— .52	0.	.....	
383,000	—1.08	— .02	.....	Ultimate strength = 2,944 pounds per square inch.

Failed by horizontal deflection, minus direction.

Deflections increased to 2".50 horizontal.

Stick B failed at the end notches in a similar manner to sketches showing failure of post No. 661.

Stick A crushed fibers at a knot $1\frac{3}{4}$" diameter, 15" from south end.

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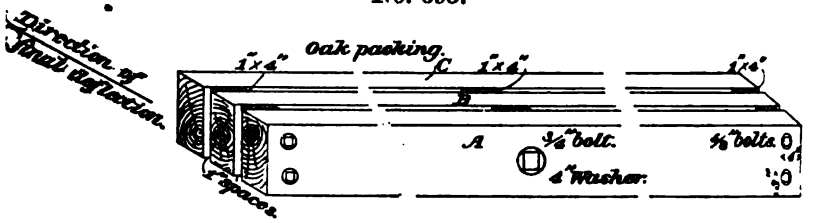
No. 693.



Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Ganged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	242	11	179.97	4.50	11.61	52.2	150
B	276	15	179.97	4.50	11.56	63.6	150
C	256	23	179.97	4.49	11.62	52.2	150
	774	.....	.....	.....	.....	168.0	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	26,100	500	.0320	.0002	0.05	0.
B	31,800	500	.0325	0.	.10	.01
C	26,100	500	.0148	—.0005	.01	0.

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
0	0.	0.	0.	
20,000	.01	—.02	.....	
40,000	.01	—.03	.....	
80,000	.01	—.03	.....	
100,000	.01	—.03	.10	
140,000	.01	—.03	.....	
180,000	.01	—.03	.....	
200,000	.02	—.03	.14	
240,000	.02	—.03	.....	
280,000	.02	—.03	.....	
300,000	.03	—.04	.15	
340,000	.05	—.04	.....	
380,000	.06	—.04	.....	
400,000	.07	—.05	.....	
440,000	.09	—.05	.....	
480,000	.11	—.05	.....	
500,000	.16	—.05	.19	
520,000	.20	—.06	.....	
540,000	.28	—.06	.....	
560,000	.44	—.06	.....	
564,000	.90	—.06	.....	Ultimate strength = 3,357 pounds per square inch.

Failed by horizontal deflection, plus direction.

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No. 694.

Same style of post as No. 693.

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	198	17	180	4.50	11.35	51.1	150
B	290	24	180	5.59	11.36	63.5	150
C	203	10	180	4.46	11.35	50.6	150
	691	.....	.....	.....	.....	165.2	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	25,550	500	.0500	0.	.18	.01
B	31,750	500	.0650	.0003	.09	.02
C	25,300	500	.0610	.0005	0.	0.

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
0	0.	0.	0.	
20,000	.04	0.	.....	
40,000	.04	0.	.....	
80,000	.05	.02	.....	
100,000	.05	.03	—.12	
140,000	.05	.04	.....	
180,000	.05	.05	.....	
200,000	.05	.05	—.13	
240,000	.05	.05	.....	
280,000	.04	.06	.....	
300,000	.04	.07	—.15	
340,000	.04	.07	.....	
380,000	.04	.08	.....	
400,000	.03	.09	—.15	
440,000	.01	.10	.....	
480,000	—.03	.10	.....	
500,000	—.10	.10	—.17	Ultimate strength = 3,027 per square inch.

Failed by deflecting horizontally, minus direction.
Horizontal deflection increased to —2″ without crushing fibers of wood or developing any local weakness.

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No. 695.

Same style of post as No. 693.

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	207	8	180	4.49	11.35	51.0	150
B	290	16	180	5.20	11.84	59.0	150
C	246	16	180	4.50	11.35	51.1	150
	743	.....	.....	.....	.....	161.1	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	25,500	500	.0429	.0002	— .01	0.
B	29,500	500	.0290	.0004	— .06	0.
C	25,550	500	.0410	.0001	0.	0.

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
0	0.	0.	0.	Stick B, "shaky"; has longitudinal seams. Stick C has dull, dead appearance in places.
20,000	0.	.02	.....	
40,000	0.	.02	.....	
80,000	— .01	.02	.....	
100,000	— .01	.02	.02	
140,000	— .01	.04	.....	
180,000	— .01	.05	.....	
200,000	— .01	.06	.02	
240,000	— .01	.07	.....	
280,000	— .01	.10	.....	
300,000	— .01	.10	.02	
340,000	— .01	.12	.....	
360,000	— .01	.12	.....	
380,000	— .01	.14	.....	
400,000	— .03	.16	.04	
420,000	— .03	.18	.....	
440,000	— .05	.19	.....	
460,000	— .07	.20	.....	
474,000	.....	.....	.....	Ultimate strength = 2,942 pounds per square inch.

Stick B failed by opening longitudinal seams.

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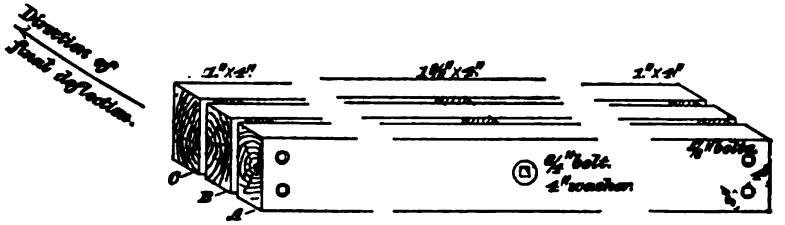
No. 696.

SWELLED POST.



Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	217	25	180	4.51	11.24	50.7	150
B	253	11	180	5.50	11.23	61.8	150
C	190	15	180	4.48	11.23	50.3	150
	660	.....	.....	.....	.....	162.8	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	25,350	500	.0337	0.	.08	.02
B	30,900	500	.0567	.0003	— .05	0.
C	25,150	500	.0715	.0010	.24	.03

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
0	0.	0.	0.	
20,000	.02	0.	.....	
40,000	.02	0.	.....	
80,000	.05	.04	.....	
100,000	.05	.05	— .10	
140,000	.09	.09	.....	
180,000	.09	.10	.....	
200,000	.09	.10	— .10	
240,000	.09	.11	.....	
280,000	.09	.12	.....	
300,000	.09	.13	— .10	
340,000	.09	.14	.....	
380,000	.09	.16	.....	
400,000	.09	.16	— .15	
440,000	.10	.17	.....	
480,000	.30	.18	.....	Ultimate strength = 2,948 pounds per square inch.

Failed by horizontal deflection plus direction. Horizontal deflection increased to 2″ without developing any local weakness.

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No. 697.

Same style of post as No. 696.

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	242	15	180	4.52	11.60	52.4	150
B	249	12	180	5.43	11.60	63.0	150
C	215	15	180	4.47	11.58	51.8	150
	706	.....	.....	.....	.....	167.2	.....

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	26,200	500	.0240	0.	—.15	—.01
B	31,500	500	.0330	—.0007	—.01	0.
C	25,900	500	.0336	0.	.28	.02

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
0.	0.	0.	0.	North end of stick A shaky.
20,000	0.	.01	.....	
40,000	0.	.03	.....	
80,000	0.	.04	.....	
100,000	0.	.05	.05	
140,000	0.	.05	.....	
180,000	0.	.05	.....	
200,000	0.	.06	.08	
240,000	0.	.06	.....	
280,000	0.	.06	.....	
300,000	0.	.07	.....	
340,000	0.	.08	.....	
380,000	.01	.08	.....	
400,000	.02	.08	.11	
440,000	.04	.08	.....	
460,000	.07	.09	.....	
480,000	.09	.09	.....	
500,000	.12	.09	.....	
520,000	.19	.10	.....	
540,000	.50	.10	.....	Ultimate strength = 3,230 lbs. per square inch.

Failed by horizontal deflection, plus direction.

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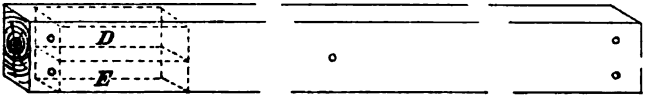
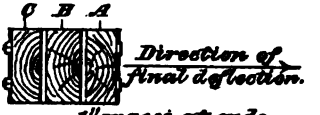
Test of specimens cut from No. 697, stick A.



Specimen.	Weight.	Rings per inch.	Length.	Size.	Sectional area.	Ultimate strength.		Remarks.
						Actual.	Pounds per square inch.	
	Lbs.		*Inches.*	*Inches.*	*Sq. inches.*	*Pounds.*		
D	7¼	6	19.95	5×3	15	73,000	4,867	Fibers crushed.
E	7	18	19.93	4.48×3	13.44	85,600	6,369	Do.

No. 698.

Same style of post as No. 696.



1" spaces at ends.
1⅝" " " middle.

Preliminary test of the single sticks.

Stick.	Weight.	Rings per inch.	Total length.	Width.	Depth.	Sectional area.	Gauged length.
	Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inches.*
A	224	15	179.94	4.46	11.60	51.7	150
B	255	8	179.94	5.53	11.70	64.7	150
C	296	15	179.94	4.50	11.59	52.2	150
	775	----------	----------	----------	----------	168.6	----------

Stick.	Loads applied.		Compression.	Compression set.	Horizontal deflection.	Permanent horizontal deflection.
	Actual.	Pounds per square inch.				
	Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*
A	25,850	500	.0290	.0009	—.34	—.02
B	32,350	500	.0585	.0005	.04	0.
C	26,100	500	.0341	.0004	.12	.02

Test of the built post.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
0.	0.	0.	0.	
20,000	0.	.02	----------	
40,000	—.01	.04	----------	
80,000	—.01	.07	----------	

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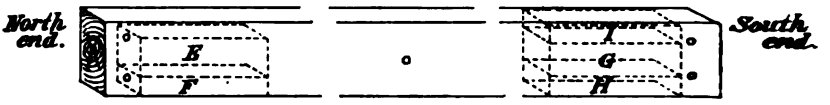
Test of the built post—Continued.

Loads applied.	Deflections.			Remarks.
	Horizontal.	Vertical, W.	Vertical, E.	
Pounds.	*Inch.*	*Inch.*	*Inch.*	
100,000	—.01	.08	—.04	
140,000	0.	.09	.....	
180,000	0.	.09	.....	
200,000	0.	.09	—.05	
240,000	0.	.09	.....	
280,000	0.	.09	.....	
300,000	0.	.09	—.07	
340,000	—.01	.09	.....	
380,000	—.02	.10	.....	
400,000	—.03	.10	.....	
440,000	—.06	.10	.....	
460,000	—.08	.10	.....	
480,000	—.12	.09	.....	
500,000	—.17	.09	—.10	
510,000	—.20	.09	.....	
520,000	—.26	.09	.....	
530,000	—.33	.09	.....	
540,000	—.48	.08	.....	
544,000	—.75	.....	.....	Ultimate strength = 3,227 lbs. per square inch.

Failed by horizontal deflection, minus direction.
Horizontal deflection increased to 2″.
Sticks taking uniform bend without crushing fibers locally.

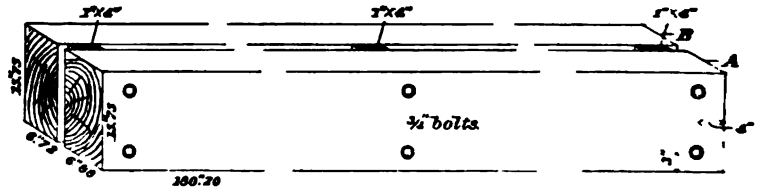
Test of specimens cut from No. 698, stick C.



South end of stick as placed in testing machine very resinous.
The rate of growth was most rapid near the heart of the stick.
Specimens E and G have about the same rate of growth, containing the heart; specimens F and H having about the same rate of growth.

Specimen.	Weight.	Rings per inch.	Length.	Size.	Sectional area.	Ultimate strength.		Remarks.
						Actual.	Pounds per square inch.	
	Lbs.		*In.*	*Inches.*	*Sq. in.*	*Pounds.*		
E	11	11	20	5.02x4.50	22.59	123,500	5,467	Fibers crushed.
F	6½	22	20	3 x4.50	13.50	86,500	6,407	Do.
G	15½	11	20	5.02x4.50	22.59	123,800	5,480	Do.
H	11	20	20	3 x4.50	13.50	79,200	5,866	Do.
I	8½	20	20	2.75x4.48	12.32	81,800	6,640	Do.

No. 488.



Weight (posts, packing, and bolts), 911 pounds.
Sectional area, 108.36; 105.84 = 214.2 square inches.

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Gauged length taken on post A, 160″.
Post free from knots.
Stick A, new timber, has not been previously tested.
Stick B previously tested in built post No. 691.

Loads applied.	Pounds per square inch.	Compression.	Permanent set.	Deflections.		Remarks.
				Horizontal.	Vertical.	
Pounds.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	
10,000		0.		0.	0.	
50,000		.0148		0.	0.	
10,000			0.	0.	0.	
100,000		.0355		0.	0.	
10,000			0.	0.	0.	
150,000		.0560		0.	0.	
10,000			0.	0.	0.	
200,000		.0785		−.02	0.	
10,000			.0010	0.	0.	
250,000		.1008		−.05	0.	
10,000			.0010	0.	0.	Snapping sounds heard.
300,000		.1240		−.08	0.	
10,000			.0015	0.	0.	
350,000		.1480		−.10	0.	
10,000			.0021	−.01	0.	
400,000		.1730		−.13	0.	
10,000			.0030	−.02	0.	
450,000				−.17	.02	
500,000				−.20	.05	
550,000				−.28	.06	
600,000				−.34	.06	
650,000				−.45	.06	
700,000	3,268			−.75	.06	Ultimate strength.
				−1.50	.06	Deflections after sustaining load 6 minutes.
10,000				−.40	0.	

Longitudinal cracks opened along middle of stick B; no cracks developed in stick A.
Time of test, one hour.

Compression of yellow-pine posts.

TABULATED RESULTS.

Number of test.	Weight.	Average rate of growth, rings per inch.	Size of post.			Sectional area.	Ultimate strength.		Manner of failure.
			Length.	Width.	Depth.		Actual.	Pounds per square inch.	
	Lbs.		*Ft. In.*	*In.*	*In.*	*Sq. in.*	*Pounds.*		
565	47	20	5 .06	5.50	5.50	30.3	172,000	5,677	Fibers crushed 12″ from end of post.
566	44	12	5 .10	5.50	5.49	30.2	141,000	4,669	Failed at knots 15″ from end.
567	45	25	5 .10	5.48	5.54	30.4	168,000	5,526	Failed at knots 9″ and 17″ from end of post.
568	47½	20	5 .10	5.46	5.50	30	108,000	3,600	Failed at knot 8″ from end of post.
562	72½	.....	7 5.98	5.45	5.52	30.1	140,000	4,651	Failed at season-cracks; crushed fibers.
563	59½	.....	7 6.14	5.46	5.46	29.8	124,000	4,161	Failed at knots 30″ from end of post.
564	57	.....	7 6.15	5.47	5.47	29.9	143,500	4,799	Failed at knots 27″ from end of post.
559	86	.....	10 .17	5.49	5.48	30.1	146,200	4,857	Deflected upward.
560	88½	.....	10 .16	5.50	5.47	30.1	139,000	4,618	Deflected downward.
561	110	.....	10 .15	5.51	5.50	30.3	143,600	4,739	Failed at knots middle of post.
556	128	.....	12 6.12	5.54	5.51	30.5	156,000	5,114	Deflected horizontally.
557	128	.....	12 6.17	5.47	5.52	30.2	156,000	5,166	Deflected diagonally.
558	141½	.....	12 6.20	5.50	5.50	30.3	150,000	4,950	Do.

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Compression of yellow-pine posts—Continued.

Number of test.	Weight.	Average rate of growth, rings per inch.	Size of post.				Sectional area.	Ultimate strength.		Manner of failure.
			Length.		Width.	Depth.		Actual.	Pounds per square inch.	
	Lbs.		*Ft.*	*In.*	*In.*	*In.*	*Sq. in.*	*Pounds.*		
553	140	.....	15	.22	5.50	5.48	30.1	99,200	3,296	Deflected downward.
554	148	.....	15	.24	5.49	5.47	30	130,000	4,333	Deflected horizontally.
555	148	.....	15	.25	5.50	5.50	30.3	129,000	4,257	Deflected diagonally.
550	172	.....	17	6.24	5.48	5.47	30	90,000	3,000	Deflected horizontally.
551	180½	.....	17	6.25	5.46	5.46	29.8	109,000	3,658	Do.
552	167½	.....	17	6.26	5.50	5.50	30.3	93,000	3,069	Do.
548	185	.....	20	.30	5.40	5.45	29.4	82,000	2,789	Do.
549	185	.....	20	.28	5.45	5.46	29.8	87,800	2,946	Do.
545	212	.....	22	6.28	5.64	5.59	31.5	73,700	2,340	Do.
546	189	.....	22	6.37	5.42	5.49	29.8	56,000	1,879	Deflected upward.
547	266	.....	22	6.30	5.65	5.61	31.7	62,500	1,972	Deflected diagonally.
508	210	.....	25	.36	5.46	5.48	29.9	52,000	1,739	Deflected horizontally.
509	235	.....	25	.30	5.46	5.49	30	59,000	1,967	Do.
510	210	.....	25	.33	5.45	5.46	29.8	55,500	1,862	Do.
499	258	.....	27	6.44	5.31	5.29	28.1	60,800	2,163	Do.
500	236	.....	27	6.43	5.32	5.30	28.2	39,000	1,383	Deflected diagonally.
501	256	.....	27	6.40	5.31	5.30	28.1	44,400	1,580	Deflected horizontally.
572	124	6	6	8.10	7.78	9.75	75.8	260,000	3,430	Failed at a knot 30″ from end of post.
573	131	14	6	8.08	7.76	9.77	75.8	286,500	3,780	Failed at a knot 26″ from end of post.
574	161½	21	6	8.10	7.74	9.81	75.9	383,000	5,046	Failed at knots 8″ from end of post.
578	233½	23	10	.13	7.74	9.73	75.3	304,000	4,037	Failed at a knot 18″ from end of post.
579	240	19	10	.14	7.78	9.75	75.9	399,500	5,264	Failed 36″ from end; grain of wood wavy.
580	240	28	10	.14	7.75	9.75	75.6	350,000	4,629	Failed at knot 17″ from end of post.
584	266	18	13	4.18	7.68	9.72	74.6	307,500	4,122	Failed at knots 15″ and 29″ from end of post.
585	258	6	13	4.15	7.75	9.74	75.5	284,000	3,762	Failed at knots 45″ from end of post.
586	336	23	13	4.20	7.75	9.75	75.6	296,000	3,921	Failed at knots near middle of post.
587	318	24	16	8.17	7.70	9.74	75	274,500	3,660	Failed at knots 50″ from end of post.
588	381	12	16	8.24	7.74	9.73	75.3	382,000	5,073	Deflected horizontally.
589	339½	21	16	8.26	7.25	9.49	68.8	304,000	4,419	Do.
530	461	.....	20	.25	7.71	9.80	75.6	287,000	3,796	Do.
531	410	.....	20	.28	7.76	9.58	74.3	275,000	3,701	Failed at knots 70″ from end of post.
532	391	.....	20	.25	7.61	9.68	73.7	220,000	2,985	Deflected horizontally.
542	501	.....	23	4.20	7.69	9.77	75.1	225,000	2,996	Do.
543	501	.....	23	4.20	7.69	9.73	74.8	220,500	2,948	Do.
544	560	.....	23	4.22	7.70	9.76	75.1	298,000	3,968	Do.
527	531	.....	26	8.30	7.40	9.47	70	210,000	3,000	Do.
528	627	.....	26	8.29	7.45	9.45	70.4	205,000	2,912	Do.
529	535	.....	26	8.30	7.46	8.94	66.7	184,500	2,766	Deflected diagonally.
711	375	12	15	.08	5.60	15.60	87.4	349,000	3,993	Deflected horizontally.
712	397	21	15	.05	5.63	15.57	87.7	339,000	3,865	Do.
713	382	15	15	.00	5.65	15.50	87.6	272,500	3,111	Do.
484	432	.....	15	.25	6.90	15.85	109.4	270,000	2,468	Deflected horizontally; knot on concave side.
708	464	17	15	.00	6.61	15.51	102.5	340,000	3,317	Failed at some knots at middle of post.
709	557	18	15	.00	6.60	15.64	103.2	455,000	4,400	Deflected horizontally.
710	491	18	14	11.92	6.61	15.61	103.2	432,000	4,186	Do.
641	561	5	15	.10	8.25	16.25	134	428,000	3,194	Fibers crushed at middle of post, vicinity of knots.
671	585	12	15	.07	8.25	16.20	133.6	425,000	3,181	Deflected horizontally.
672	578	13	14	11.93	8.20	16.20	132.8	526,000	3,961	Do.
485	434	.....	15	.27	6.75	15.95	107.7	175,000	1,625	Deflected horizontally; knots on concave side.
487	450	.....	15	.25	6.80	15.72	106.9	310,000	2,900	Deflected horizontally; initial bend in post.
486	705	.....	15	.24	8.63	16.63	145.2	380,000	2,617	Opened shakes and season-cracks.

Second test of these posts.

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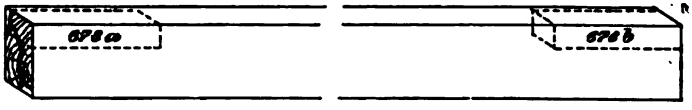
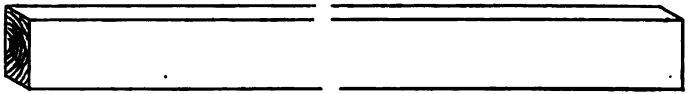
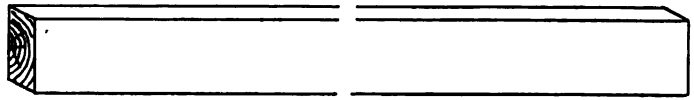
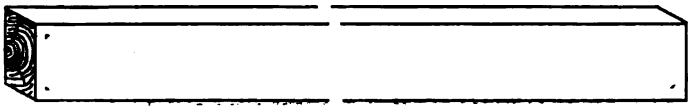
Compression of yellow pine—Single sticks and built posts.

TABULATED RESULTS.

Number of test.	Kind of post.	Weight.	Average rate of growth. Rings per inch.	Dimensions of post. Length.	Width.	Depth.	Sectional area.	Compression in 150 inches. Load of 500 pounds per square inch.	Ultimate strength. Actual.	Pounds per square inch.
		Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inch.*	*Pounds.*	
673		260	11	180.05	4.09	11.35	46.04	.0370	142,300	3,065
673a		13		20	4.01	4.01	16.08		94,000	5,846
673b		7½		20	3.95	3.97	15.68		90,600	5,352
674		233	17	180	4.51	11.60	52.3	.0492	131,500	2,515
675		194	22	180	4.34	11.60	50.3	.0490	121,200	2,410
490		269	.....	180	5.05	12.10	61.1	.....	230,000	3,764

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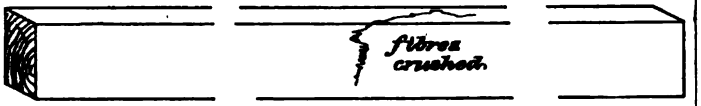
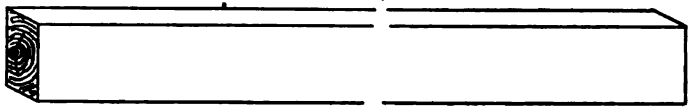
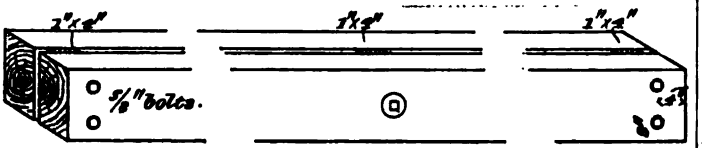
Compression of yellow pine—single sticks and built posts—Continued.

Number of test.	Kind of post.	Weight.	Average rate of growth. Rings per inch.	Dimensions of post. Length.	Width.	Depth.	Sectional area.	Compression in 150 inches. Load of 500 pounds per square inch.	Ultimate strength. Actual.	Pounds per square inch.
		Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inch.*	*Pounds.*	
670		309	12	180	5.65	11.74	66.3	.0455	205,900	3,106
489		287	.....	180.08	5.85	12.05	70.5	.....	250,000	3,546
654		326 / 290 } 616	11 / 6	180 / 180	5.63 / 5.62	11.71 / 11.71	65.9 / 65.9 } 131.8	.0418 / .0540	470,000	3,566
655	Same style as No. 654	292 / 329 } 621	34 / 24	179.93 / 179.93	5.64 / 5.63	11.72 / 11.72	66.1 / 66.1 } 132.2	.0202 / .0315	580,000	4,387
656	Same style as No. 654	282 / 287 } 569	13 / 11	180 / 180	5.61 / 5.61	11.71 / 11.71	65.7 / 65.7 } 131.4	.0368 / .0400	480,000	3,653

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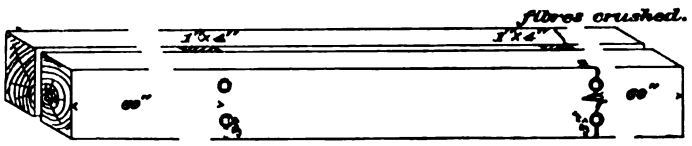
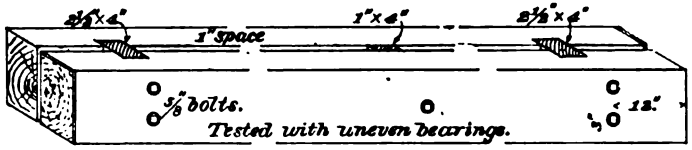
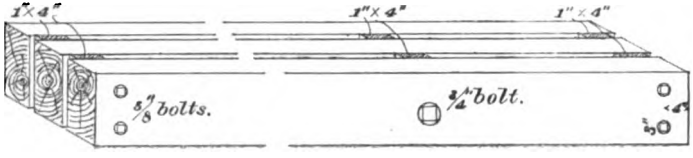
651	Same as No. 654, except swelled ¾" at middle	262 275	537	11 7	180 180	5.58 5.58	11.71 11.71	65.3 65.3	130.6	.0520 .0514	360,000	2,756
652	Same as No. 654, except swelled ¾" at middle	310 370	680	16 16	180 180	5.58 5.58	11.70 11.71	65.3 65.3	130.6	.0395 .0300	588,500	4,506
653	Same as No. 654, except swelled ¾" at middle	310 311	621	16 12	180 180	5.63 5.59	11.71 11.68	65.9 65.3	131.2	.0559 .0550	436,600	3,328
657		340 319	659	9 13	179.96 179.96	5.63 5.64	11.72 11.71	66.0 66.0	132.0	.0375 .0365	580,000	4,394
658	Same style as No. 657	319 332	651	12 9	179.96 179.96	5.59 5.59	11.71 11.72	65.5 65.5	131.0	.0320 .0436	448,000	3,420
659	Same style as No. 657	320 293	613	12 8	180 180	5.61 5.61	11.73 11.73	65.8 65.8	131.6	.0312 .0372	600,000	4,559
660		283 294	577	25 18	180.03 180.03	5.61 5.63	11.22 11.24	62.9 63.3	126.2	.0323 .0400	510,000	4,041
661	Same style as No. 660. Tested with uneven bearings	274 310	584	12 9	180 180	5.66 5.60	11.70 11.72	66.2 65.6	131.8	.0410 .0365	410,000	3,111
662	Same style as No. 660. Tested with uneven bearings	292 280	572	14 8	180 180	5.61 5.61	11.75 11.75	65.9 65.9	131.8	.0340 .0500	388,000	2,944
693		242 276 256	774	11 15 23	179.97 179.97 179.97	4.50 5.50 4.49	11.61 11.56 11.62	52.2 63.6 52.2	168.0	.0320 .0325 .0148	564,000	3,357

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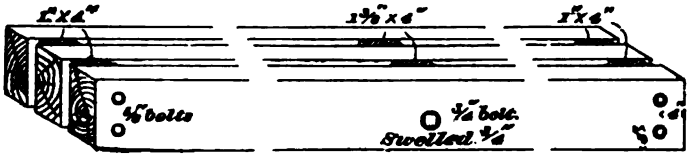
Compression of yellow pine—single sticks and built posts—Continued.

Number of test.	Kind of post.	Weight.	Average rate of growth. Rings per inch.	Dimensions of post. Length.	Width.	Depth.	Sectional area.	Compression in 150 inches. Load of 500 pounds per square inch.	Ultimate strength. Actual.	Pounds per square inch.
		Pounds.		*Inches.*	*Inches.*	*Inches.*	*Sq. inches.*	*Inch.*	*Pounds.*	
694	Same style as No. 693	193 290 691 208	17 24 10	180 180 180	4.50 5.59 4.46	11.35 11.36 11.35	51.1 63.5 165.2 50.6	.0500 .0650 .0610	500,000	3,027
695	Same style as No. 693	207 290 743 246	8 16 16	180 180 180	4.49 5.20 4.50	11.35 11.34 11.35	51.0 59.0 161.1 51.1	.0429 .0290 .0410	474,000	2,942
696		217 253 660 190	25 11 15	180 180 180	4.51 5.50 4.48	11.24 11.23 11.23	50.7 61.8 162.8 50.3	.0337 .0567 .0715	480,000	2,948
697	Same style as No. 696	242 249 706 215	15 12 15	180 180 180	4.52 5.43 4.47	11.60 11.60 11.58	52.4 63.0 167.2 51.8	.0240 .0330 .0336	540,000	3,230

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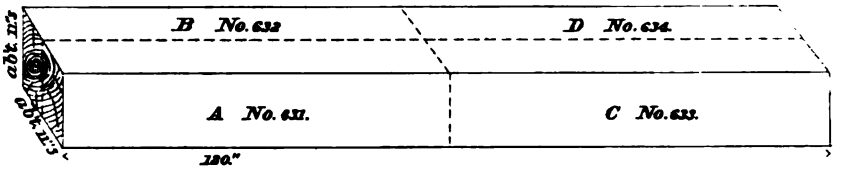
THOROUGHLY SEASONED YELLOW-PINE POST FROM THE ARSENAL STOREHOUSE.

TIME TESTS.



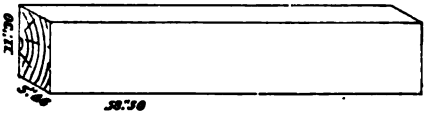
Yellow-pine post about 11″.5 square by 10 feet long, cut into four specimens—A, B, C, and D.

Specimens A and D tested by gradually increasing the compression loads till failure took place.

Specimens B and C tested by applying increments of 200 pounds per square inch compression, allowing each increment to remain five minutes; measuring the compression when first applied and again at the end of five minutes, then releasing the strains to zero-load, measuring the compression set immediately and again after five minutes' rest; so proceeding to the end of the test.

No. 631.

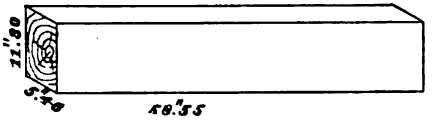
SPECIMEN A.



Sectional area, 61.7 square inches.
Weight, 86½ pounds.
Average rate of growth, 9 rings per inch.
Ultimate strength, 422,000 pounds = 6,840 pounds per square inch.
Time of test, 14 minutes.
Deflected sideways, crushing fibers on the concave side.

No. 632.

SPECIMEN B.



Sectional area, 61.7 square inches.
Weight, 85 pounds.
Gauged length, 30″.

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Loads applied.	Pounds per square inch.	Compression	Compression set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
0	0	0.		
12,340	200	0.		
		0.		
	0		— .0005	
			— .0005	
24,680	400	.0022		
		.0024		
	0		— .0008	
			— .0006	
37,020	600	.0050		
		.0052		
	0		— .0006	
			— .0008	
49,360	800	.0078		
		.0079		
	0		—. 0006	
			—. 0006	
61,700	1,000	.0108		
		.0110		
	0		— .0004	
			— .0008	
74,040	1,200	.0137		
		.0139		
	0		— .0005	
			— .0008	
86,380	1,400	.0164		
		.0166		
	0		— .0006	
			— .0008	
98,720	1,600	.0191		
		.0194		
	0		— .0005	
			— .0005	
111,060	1,800	.0219		
		.0221		
	0		— .0004	
			— .0005	
123,400	2,000	.0248		
		.0249		
	0		— .0002	
			— .0003	
			0.	Rested over night 15 hours.
135,740	2,200	.0270		
		.0275		
	0		0.	
			0.	
148,080	2,400	.0300		
		.0301		
	0		.0003	
			.0002	
160,420	2,600	.0326		
		.0330		
	0		.0005	
			.0005	
172,760	2,800	.0358		
		.0360		
	0		.0009	
			.0005	
185,100	3,000	.0388		
		.0393		
	0		.0010	
			.0009	
197,440	3,200	.0420		
		.0424		
	0		.0011	
			.0010	
209,780	3,400	.0449		
		.0453		
	0		.0015	
			.0011	
222,120	3,600	.0478		
		.0483		
	0		.0019	
			.0015	
234,460	3,800	.0509		
		.0513		
	0		.0018	
			.0016	
246,800	4,000	.0539		
		.0546		

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Loads applied.	Pounds per square inch.	Compression.	Compression set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
	0		.0024	
			.0020	
259,140	4,200	.0570		
		.0576		
	0		.0025	
			.0020	
271,480	4,400	.0600		
		.0607		
	0		.0030	
			.0025	
283,820	4,600	.0634		
		.0646		
	0		.0035	
			.0030	
296,160	4,800	.0670		
		.0682		
	0		.0044	
			.0035	
308,500	5,000	.0702		
		.0720		
	0		.0050	
			.0042	
320,840	5,200	.0742		
		.0762		
	0		.0060	
			.0052	
333,180	5,400	.0785		
		.0810		
	0		.0075	
			.0068	
345,520	5,600	.0830		
		.0870		
	0		.0089	
			.0080	
357,860	5,800	.0891		
		.0941		
	0		.0114	
			.0097	
370,200	6,000	.0965		
		.1008		
	0		.0133	
			.0115	
382,540	6,200	.1030		Ultimate strength.

Crushed fibers 12″ from end at a knot.

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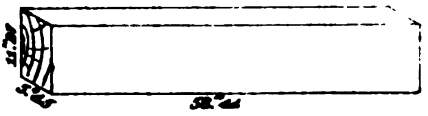
No. 633.

SPECIMEN C.



Sectional area, 61.4 square inches.
Weight, 86 pounds.
Gauged length, 30″.

Loads applied.	Pounds per square inch.	Compression.	Compression set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
0	0	0.		
12, 280	200	.0024		
		.0024		
	0		.0006	
			.0008	
24, 560	400	.0052		
		.0052		
	0		.0007	
			.0005	
36, 840	600	.0079		
		.0080		
	0		.0009	
			.0005	
49, 120	800	.0106		
		.0112		
	0		.0008	
			.0005	
61, 400	1, 000	.0139		
		.0140		
	0		.0006	
			.0006	
73, 680	1, 200	.0169		
		.0171		
	0		.0009	
			.0010	
85, 960	1, 400	.0197		
		.0199		
	0		.0010	
			.0009	
98, 240	1, 600	.0227		
		.0230		
	0		.0011	
			.0010	
110, 520	1, 800	.0258		
		.0259		
	0		.0013	
			.0010	
122, 800	2, 000	.0284		
		.0289		
	0		.0011	
			.0010	
135, 080	2, 200	.0315		
		.0318		
	0		.0013	
			.0010	
147, 360	2, 400	.0347		
		.0350		
	0		.0015	
			.0011	Rested 30 minutes without further recovery.
159, 640	2, 600	.0377		
		.0381		
	0		.0018	
			.0015	
171, 920	2, 800	.0410		
		.0410		
	0		.0020	
			.0016	
184, 200	3, 000	.0440		
		.0445		

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Loads applied.	Pounds per square inch.	Compression.	Compression set.	Remarks.
Pounds.		*Inch.*	*Inch.*	
	0		.0020	
			.0020	
196,480	3,200	.0470		
		.0477		
	0		.0025	
			.0020	
208,760	3,400	.0500		
		.0505		
	0		.0030	
			.0021	
221,040	3,600	.0535		
		.0540		
	0		.0030	
			.0029	
233,320	3,800	.0564		
		.0572		
	0		.0037	
			.0030	
245,600	4,000	.0599		
		.0610		
	0		.0040	
			.0036	
257,880	4,200	.0634		
		.0640		
	0		.0044	
			.0040	
270,160	4,400	.0664		
		.0675		
	0		.0050	Rested over night 15 hours.
			.0043	
			.0032	
282,440	4,600	.0691		
		.0707		
	0		.0053	
			.0049	
294,720	4,800	.0730		
		.0739		
	0		.0063	
			.0052	
307,000	5,000	.0764		
		.0780		
	0		.0070	
			.0062	
319,280	5,200	.0810		
		.0825		
	0		.0080	
			.0070	
331,560	5,400	.0850		
		.0875		
	0		.0095	
			.0085	
343,840	5,600	.0898		
		.0931		
	0		.0115	
			.0101	
356,120	5,800	.0958		
		.0995		
	0		.0138	
			.0121	
368,400	6,000	.1025		
		.1074		
	0		.0167	
			.0149	
380,680	6,200	.1125		
		.1194		
	0		.0210	
			.0192	
392,960	6,400	.1234		
		.1335		
	0		.0280	
			.0250	
405,240	6,600	.1357		Ultimate strength.

Fibers crushed 16″ from end of specimen, which took a slight deflection sideways.

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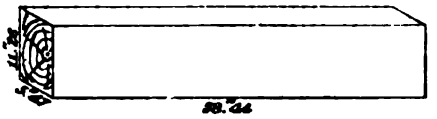
No. 634.

SPECIMEN D.



al area, 61. 6 square inches.
t, 88½ pounds.
d length, 30″.

Loads applied.	Pounds per square inch.	Compression.	Remarks.
Pounds.		*Inch.*	
0	0	0.	
12, 320	200	.0040	
24, 640	400	.0075	
36, 960	600	.0108	
49, 280	800	.0134	
61, 600	1, 000	.0159	
73, 920	1, 200	.0185	
86, 240	1, 400	.0214	
98, 560	1, 600	.0240	
110, 880	1, 800	.0268	
123, 200	2, 000	.0292	
135, 520	2, 200	.0320	
147, 840	2, 400	.0348	
160, 160	2, 600	.0375	
172, 480	2, 800	.0404	
184, 800	3, 000	.0430	
197, 120	3, 200	.0460	
209, 440	3, 400	.0485	
221, 760	3, 600	.0512	
234, 080	3, 800	.0540	
246, 400	4, 000	.0570	
258, 720	4, 200	.0598	
271, 040	4, 400	.0627	
283, 360	4, 600	.0655	
295, 680	4, 800	.0682	
308, 000	5, 000	.0712	
320, 320	5, 200	.0744	
332, 640	5, 400	.0776	
344, 960	5, 600	.0812	
357, 280	5, 800	.0852	
369, 600	6, 000	.0892	
381, 920	6, 200	.0938	
394, 240	6, 400	.0975	
428, 700	.....	.....	Ultimate strength.

of test, 22 minutes.
s crushed from 4″ to 8″ from end of specimen.

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COMPRESSION OF WOOD (OAK AND PINE).

Compression tests of samples of yellow pine and white oak cut from round posts tested for Edward Atkinson.

Specimens rectangular, 32″ long each.

WHITE OAK.

Dimensions of original post: Length, 168″; diameter, 10″.54; sectional area, 84.8 square inches; diameter of core, 1″.75.
Ultimate strength, 420,000 pounds = 4,953 pounds per square inch.

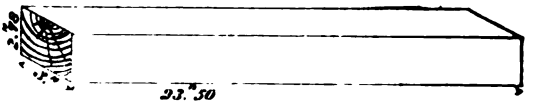
No. 621.

Sectional area, 20 square inches.
Weight, 17¼ pounds.
Ultimate strength, 169,000 pounds = 8,450 pounds per square inch.
Failed 6″ from end where the grain was wavy.

No. 621*a*.

WHITE OAK.

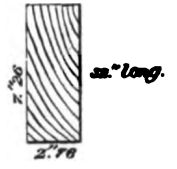
Specimen cut from No. 621.



Sectional area, 8.34 square inches.
Ultimate strength, 65,000 pounds = 7,794 pounds per square inch.
Failed at a knot 5″ from end.

No. 622.

Specimen cut from same post as No. 621.



Sectional area, 20 square inches.
Weight, 17½ pounds.
Ultimate strength, 137,000 pounds = 6,850 pounds per square inch.
Failed by opening a longitudinal seam along a row of knots.

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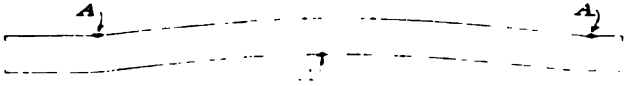
YELLOW PINE.

Dimensions of original post: Length, 167″.90; diameter, 7″.70; sectional area (mean), 45.8 square inches; diameter of core, 1″.60.
Ultimate strength, 200,000 pounds = 4,367 pounds per square inch.

No. 623.

Sectional area, 8.77 square inches.
Weight, 8 pounds.
Ultimate strength, 47,300 pounds = 5,390 pounds per square inch.
Failed by deflecting sideways, crushing fibers on the concave side at middle; also $1\frac{3}{4}$″ from one end and $4\frac{3}{4}$″ from the other end on the opposite side from the crushing at the middle, as indicated by letters *A* on the sketch.



No. 624.

Specimen cut from same post as No. 623.

Sectional area, 8.8 square inches.
Weight, 9 pounds.
Ultimate strength, 48,300 pounds = 5,490 pounds per square inch.
Failed by deflecting sideways, crushing fibers on the concave side.

YELLOW PINE.

Original post tested with one flat end and one round end.
Dimensions of original post: Length, 143″.04; diameter, 8″; sectional area, 48.25 square inches; diameter of core, 1″.60.
Ultimate strength, 225,000 pounds = 4,663 pounds per square inch.

No. 625.

Sectional area, 8.8 square inches.
Weight, 8 pounds.
Ultimate strength, 51,200 pounds = 5,820 pounds per square inch.
Failed by fibers crushing, stick taking a slight horizontal deflection.

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No. 626.

Specimen cut from same post as No. 625.

Sectional area, 8.8 square inches.
Weight, 8 pounds.
Ultimate strength, 58,000 pounds = 6,590 pounds per square inch.
Fibers crushed at a knot 9" from end of specimen.

WHITE OAK.

Dimensions of original post: Length, 164".08; diameter, 9".25; sectional area, 64.4 square inches; diameter of core, 1".90.
Ultimate strength, 221,000 pounds = 3,432 pounds per square inch.

No. 627.

Sectional area, 13.1 square inches.
Weight, 11½ pounds.
Ultimate strength, 63,100 pounds = 4,817 pounds per square inch.
Failed at a knot 10" from end of specimen.

No. 628.

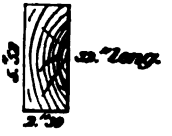
Specimen cut from same post as No. 627.

Sectional area, 13 square inches.
Weight, 11½ pounds.
Ultimate strength, 81,000 pounds = 6,230 pounds per square inch.
Failed at a group of knots 8" from end of specimen.

WHITE OAK.

Tested with pintle ends.
Dimensions of original post: Length, 163".80; diameter, 9".35; sectional area, 65.8 square inches; diameter of core, 1".90.
Ultimate strength, 215,000 pounds = 3,267 pounds per square inch.

No. 629.



Sectional area, 13.19 square inches.
Weight, 11¾ pounds.
Ultimate strength, 79,900 pounds = 6,058 pounds per square inch.
Failed at a group of knots near middle of specimen.

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No. 630.

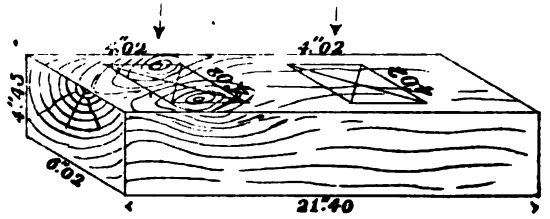
Specimen cut from same post as No. 629.

Sectional area, 13.08 square inches.
Weight, 11¾ pounds.
Ultimate strength, 80,900 pounds = 6,185 pounds per square inch.
Failed at a knot 6″ from end of specimen.

Indentation of wood perpendicular to grain.

No. 714.

WHITE PINE.



Compressed area, 4″.02 × 4″.02 = 16.16 square inches.
End A straight-grained.
End B compressed area covers two knots.
Cast-iron block pressed against wood.

END A.

Loads applied.	Pounds per square inch.	Indentation.	Remarks.
Pounds.		*Inch.*	
0	0	0.	
1,616	100	0.	
3,232	200	0.	
4,848	300	0.	
6,464	400	.01	
8,080	500	.02½	
9,696	600	.05	1/10″ indentation.
11,312	700	.46	

END B.

0	0	0.	
1,616	100	0.	
3,232	200	0.	
4,848	300	.01½	
6,464	400	.03	
8,080	500	.03½	
9,697	600	.03½	
11,312	700	.04	
12,300	.....	.05	1/10″ indentation.
12,928	800	.09	
14,544	900	.15	

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No. 715.

WHITE PINE.

Size of specimen, 6″ × 4″.4 × 24″ long.
Compressed area, 4″.02 × 4″.02 = 16.16 square inches.
End A straight-grained.
End B compressed area covers knot 1¾″ diameter.

END A.

Loads applied.	Pounds per square inch.	Indentation.	Remarks.
Pounds.		*Inch.*	
0	0	0.	
1,616	100	.01	
3,232	200	.02	
4,848	300	.02	
6,464	400	.03	
7,800	.....	.05	$\frac{1}{20}$″ indentation.
8,080	500	.08	
9,696	600	.28	

END B.

0	0	0.	
1,616	100	0.	
3,232	200	0.	
4,848	300	0.	
6,464	400	0.	
8,080	500	.01	
9,696	600	.01	
11,312	700	.01	
12,928	800	.02	
14,544	900	.02¼	
16,160	1,000	.03	
19,100	.....	.05	$\frac{1}{20}$″ indentation.

No. 716.

WHITE PINE.

Size of specimen, 6″ × 4″.4 × 24″ long.
Compressed area, 4″.02 × 4″.02 = 16.16 square inches.
End A straight-grained.
End B compressed area covers a knot 2¼″ diameter.

END A.

Loads applied.	Pounds per square inch	Indentation.	Remarks.
Pounds		*Inch.*	
0	0	0.	
1,616	100	0.	
3,232	200	0.	
4,848	300	.01	
6,464	400	.02	
8,080	500	.04	
9,696	600	.05	$\frac{1}{20}$″ indentation.
11,312	700	.14	
12,928	800	.31	

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END B.

0	0	0.	
1,616	100	.00½	
3,232	200	.00½	
4,848	300	.00½	
6,464	400	.00½	
8,080	500	.01	
9,696	600	.01	
11,312	700	.02	
12,928	800	.02	
14,544	900	.02½	
16,160	1,000	.03	
22,400	.....	.05	$\frac{1}{20}$" indentation.
25,856	1,600	.13	

No. 717.

YELLOW PINE.

Size of specimen, 5".50 × 4".50 × 24".
Compressed area, 4".02 × 4".02 = 16.16 square inches.
End A straight-grained.
End B compressed area covers a knot 2¼" diameter.

END A.

Loads applied.	Pounds per square inch.	Indentation.	Remarks.
Pounds.		*Inch.*	
0	0	0.	
3,232	200	0.	
6,464	400	0.	
9,696	600	0.	
12,928	800	.00½	
16,160	1,000	.00½	
19,392	1,200	.03	
21,080	1,300	.03½	
22,624	1,400	.04½	
		.05	$\frac{1}{20}$" indentation.
24,240	1,500	.13	
25,856	1,600	.18	

END B.

0	0	0.	
3,232	200	.00½	
9,696	600	.00½	
16,160	1,000	.00½	
22,624	1,400	.01	
29,088	1,800	.02	
39,100	.....	.05	$\frac{1}{20}$" indentation.

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47TH CONGRESS, 2d Session. } SENATE. { Ex. DOC. No. 2.

MESSAGE

FROM THE

PRESIDENT OF THE UNITED STATES,

TRANSMITTING

A communication from the Secretary of War and its accompanying papers, recommending the amendment of section 1216 Revised Statutes, relating to enlisted men of the Army, also the modification of section 1285 Revised Statutes, &c.

DECEMBER 6, 1882.—Read and referred to the Committee on Military Affairs and ordered to be printed.

To the Senate and House of Representatives:

I transmit herewith a communication from the Secretary of War, dated the 4th instant, and its accompanying papers, in which it is recommended that section 1216 Revised Statutes be so amended as to include in its provisions all enlisted men of the Army; and that section 1285 Revised Statutes be modified so as to read:

A certificate of merit granted to an enlisted man for distinguished service shall entitle him thereafter to additional pay, at the rate of two dollars per month, while he is in the military service, although such service may not be continuous.

CHESTER A. ARTHUR.

EXECUTIVE MANSION,
December 6, 1882.

WAR DEPARTMENT,
Washington City, December 4, 1882.

SIR: I have the honor to inclose herewith, with request for its transmission to Congress, a letter from the Adjutant-General of the Army, dated the 24th ultimo, recommending that section 1216 Revised Statutes be so amended as to include in its provisions all enlisted men of the Army; also recommending that section 1285 Revised Statutes be modified so as to read:

A certificate of merit granted to an enlisted man for distinguished service shall entitle him thereafter to additional pay, at the rate of two dollars per month, while he is in the military service, although such service may not be continuous.

Accompanying also are certain papers relating to the case of Sergeant James Fegan, Company H, Third Infantry, which illustrate the peculiar operation, in its present condition, of the law in question.

It may be remarked that similar recommendations were, under date of April 12, 1878, submitted by this department to Congress and were

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referred to the Senate Committee on Military Affairs and ordered to be printed, as is shown by the inclosed copy of Senate Ex. Doc. No. 62, Forty-fifth Congress, second session.

Very respectfully, your obedient servant,

ROBERT T. LINCOLN,
Secretary of War.

The PRESIDENT.

WAR DEPARTMENT,
ADJUTANT-GENERAL'S OFFICE,
Washington, November 24, 1882.

SIR: I have the honor to recommend that the attention of Congress at its coming session be again called to section 1216 Revised Statutes, with a view to the amendment of that section so as to embrace in its provisions all "enlisted" men. This section is construed now as applying to "private soldiers" only, thus excluding many worthy non-commissioned officers, musicians, &c., who have distinguished themselves in action, but who, by the wording of the law, are excluded from receiving certificates of merit for meritorious conduct in action.

At the same time I respectfully recommend that section 1285 Revised Statutes be modified to read as follows:

A certificate of merit granted to an enlisted man for distinguished service shall entitle him thereafter to additional pay, at the rate of two dollars per month, while he is in the military service, although such service may not be continuous.

Both of these subjects were brought to the attention of Congress by the Secretary of War, April 12, 1878, as shown by copy of Senate Ex. Doc. No. 62, herewith inclosed, from which it will be observed that the matter was referred to the Committee on Military Affairs, and ordered to be printed, but no further action appears to have been taken.

In connection with this subject I respectfully call attention to the case of Sergeant James Fegan, Company H, Third Infantry, whose heroic conduct is set forth in the accompanying papers, and who applied to the War Department for a certificate of merit, but whose application had to be denied on account of the defect in the law as set forth above.

I am, sir, very respectfully, your obedient servant,

R. C. DRUM,
Adjutant-General.

The Hon. SECRETARY OF WAR.

[Special Order No. 39.]

HEADQUARTERS FORT DODGE, KANS.,
March 15, 1868.

It becomes the pleasant duty of the commanding officer to notice in terms of approbation the conduct of Sergt. James Fegan, of Company H, Third United States Infantry, while in charge of a supply train *en route* from Fort Harker to Fort Dodge, Kans.

During the journey, while encamped at Plum Creek, Sergt. John W. Blake, Troop B, Seventh United States Cavalry, aided by some citizens, made a violent and cowardly assault upon Sergeant Fegan, while the latter was guarding a deserter, whom he had recently apprehended. He was threatened with death if he did not allow the prisoner to escape; but, true to his trust and to his good record as a soldier, he yielded nothing but what was wrested from by force, and at the same time defended himself with great courage and ability; he defended single-handed the train freighted with gunpowder when threatened and brought it safely to this post.

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The courage and firmness with which Sergeant Fegan performed this difficult duty is worthy of all praise, and is in keeping with his excellent record as a soldier through many years of service. His conduct is worthy the emulation of all the soldiers of this command who deem their profession honorable, and who desire to fulfill the requirements of it with honor and credit to themselves.

By order of Maj. H. Douglas.

THOS. S. WALLACE,
Second Lieutenant, Third United States Infantry, Post Adjutant.

FORT MISSOULA, MONT., *November* 5, 1882.

SERGEANT: At your request I express in writing my opinion as to your prospects of obtaining the additional compensation of two dollars a month, such extra pay being based on your having a medal of honor, but no certificate of merit.

I cheerfully certify to your long and honorable service, covering a period nearly equal to my own age. With equal willingness I certify to the integrity of your personal character. I have scrutinized with pleasure and interest the many testimonials that you have received from numerous officers confirmatory of your past career as a soldier. I am glad to have in my company a man who has been considered by the Congress of the United States worthy of the award of a battle medal, but I regret to say that it appears to me that under the law certificates of merit are granted only to privates, and that the gratuity of two dollars per month appears to be allowed only in case where certificates of merit have been given, and does not appear to be allowed to holders of medals of honor.

I understand that you claim that a medal of honor is a certificate of merit, and of a higher class than mere paper. I hope that you will succeed in impressing your views upon the high authority which alone can decide your claim.

Yours truly,

PHILIP READE,
First Lieutenant, Third Infantry, Commanding Company H.

Sergt. JAMES FEGAN,
Company H, Third Infantry.

[Senate Ex. Doc. No. 62, Forty-fifth Congress, second session.]

Letter from the Secretary of War, transmitting a communication from the General of the Army, recommending the amendment of section 1216 *and the modification of section* 1285 *of the Revised Statutes, so as to entitle the holders of certificates of merit to the additional pay of* $2 *per month while in the military service.*

APRIL 15, 1878.—Referred to the Committee on Military Affairs and ordered to be printed.

WAR DEPARTMENT,
Washington City, April 12, 1878.

The Secretary of War has the honor to transmit to the United States Senate a letter from the General of the Army, and recommend that section 1216 Revised Statutes be so amended as to include all enlisted men in its provisions; and also to recommend that section 1285 Revised Statutes be so modified as to entitle the holder of a certificate of merit to the additional pay of $2 per month while in the military service, whether such service shall have been continuous or not.

GEO. W. McCRARY,
Secretary of War.

The PRESIDENT
of the United States Senate.

HEADQUARTERS OF THE ARMY,
ADJUTANT-GENERAL'S OFFICE.
Washington, April 8, 1882.

SIR: I have the honor to recommend that section 1216 Revised Statutes be so amended as to include in its provisions all *enlisted* men. As I construe it, it only applies to private soldiers, while there are many non-commissioned officers, musicians, &c., who have distinguished themselves in the service, but who, from want of education, from advanced age, or other circumstances, are not qualified for a commission, but who would feel honored and complimented to receive the "certificate of merit."

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The law, however, only authorizes these certificates to be given to *pirates*, and the consequence is that many non-commissioned officers receive no reward *at all*, although their claims may be as strong, if not stronger than those of others who will receive certificates of merit; and their rank, which is only a partial reward for services and good conduct, operates as a bar to their receiving this honor and emoluments.

It is also respectfully recommended that section 1285 Revised Statutes be modified to read as follows: A certificate of merit granted to an enlisted man by the President for distinguished services shall entitle him thereafter to additional pay, at the rate of two dollars per month, while he is in the military service, although such service may not be continuous.

I have the honor to be, sir, very respectfully, your obedient servant,

W. T. SHERMAN,
General.

To the Hon. SECRETARY OF WAR.

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47TH CONGRESS, 2d Session. } SENATE. { EX. DOC. No. 3.

MESSAGE

FROM THE

PRESIDENT OF THE UNITED STATES,

TRANSMITTING

A communication from the Secretary of War, inclosing one from the commanding general Department of the Missouri, indorsed by the division commander, urging prompt action for perfecting of title to the site of Fort Bliss, Texas.

DECEMBER 6, 1882.—Read and referred to the Committee on Military Affairs and ordered to be printed.

To the Senate and House of Representatives:

I transmit herewith, for the consideration of Congress, a communication from the Secretary of War, inclosing one from the commanding general Department of the Missouri, indorsed by the division Commander, urging the advisability of prompt action in the matter of perfecting the title to the site of Fort Bliss, Texas.

Accompanying also is a copy of Senate Executive Document No. 96, Forty-seventh Congress, first session, which presents fully the facts in the case as well as the character of the legislation necessary to secure to the United States proper title to the land in question.

The Secretary of War expresses his concurrence in the views of the military authorities as to the importance of this subject and urges that the requisite legislation be had by Congress at its present session.

CHESTER A. ARTHUR.

EXECUTIVE MANSION,
December, 1882.

WAR DEPARTMENT,
Washington City, December 4, 1882.

SIR: In connection with previous correspondence touching the question of title to the site of Fort Bliss, Texas, as published in Senate Executive Document No. 96, Forty-seventh Congress, first session (copy inclosed), I have the honor to inclose herewith, with request for its transmission to Congress, a copy of a communication received at this department, through military channels, from General John Pope, commanding the military department of the Missouri, urging the advisability of prompt action in the matter of perfecting the title to said site.

As the inclosed executive document presents a comprehensive state-

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ment of the facts in the case, and of the legislation necessary to secure to the United States proper title, I deem it sufficient in this communication to simply express my concurrence in the views of Generals Pope and Sheridan as to the importance of this subject, and to respectfully urge that the requisite legislation be had by Congress at its present session.

Very respectfully, your obedient servant,

ROBERT T. LINCOLN,
Secretary of War.

The PRESIDENT.

[Senate Ex. Doc. No. 96, Forty-seventh Congress, first session.]

Message from the President of the United States, transmitting a communication from the Secretary of War, inclosing copies of papers relating to the site of Fort Bliss, at El Paso, Tex., with especial reference to certain errors contained in the deeds conveying the land to the United States.

February 8, 1882.—Read, referred to the Committee on Military Affairs, and ordered to be printed.

To the Senate and House of Representatives:

I transmit herewith, for the consideration of Congress, a communication from the Secretary of War, inclosing copies of papers relating to the site of Fort Bliss, at El Paso, Tex., with especial reference to certain errors contained in the deeds conveying the land to the United States, and recommending the passage by Congress of an act, a draft of which is also inclosed, to rectify and establish the title of the United States to the site in question.

CHESTER A. ARTHUR.

EXECUTIVE MANSION,
February 8, 1882.

WAR DEPARTMENT,
Washington City, February 3, 1882.

I have the honor to transmit herewith, with request for their transmission to Congress, copies of official papers relating to the site of Fort Bliss, at El Paso, Tex.: the transfer deeds to which site, by reason of erroneous descriptions, failed to convey to the United States certain lands intended to be so conveyed, while certain other land, not intended to be conveyed, was, in fact, embraced therein.

The facts connected with the subject are fully and clearly set forth in the accompanying papers, and, as legislation by Congress is necessary to rectify and establish the title of the United States to the site in question, I would respectfully recommend the passage of an act for that purpose, a draft of which is herewith submitted.

I am, sir, very respectfully, your obedient servant,

ROBERT T. LINCOLN,
Secretary of War.

The PRESIDENT.

AN ACT to rectify and establish the title of the United States to the site of the military post at El Paso, Texas.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in order fully and accurately to carry out an agreement heretofore made between the United States and the heirs of Simeon Hart, deceased, by which the latter, for the consideration of one hundred dollars, agreed to convey to the United States a tract of land containing one hundred and thirty-two acres, more or less, situated at El Paso, Tex., as a site for the military post authorized to be established by an act of Congress approved February 4, 1879; and for the purpose of correcting and rectifying the grant intended to be made of such land in and by cer-

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tain deeds executed and delivered to the United States on September 25, 1879, by Antonia Hart, and Juan Hart, by his attorney, Leonardo Hart, which said deeds contained erroneous descriptions of said premises, by reason of which certain land intended to be conveyed was not included in the grant, and certain land not intended to be conveyed was in fact embraced therein—the Secretary of War be, and he is hereby, authorized and required to receive from said heirs, or other proper persons holding or representing legal title, a new, accurate, and complete conveyance to the United States of the premises originally agreed and intended to be conveyed to and vested in the same for the purpose aforesaid; and further, for and in the name of the United States, to reconvey to the said heirs, or other proper parties, such portion of the land as has heretofore been erroneously conveyed to the United States by reason of the incorrect descriptions contained in the said deeds aforesaid.

[General Orders No. 7.]

HEADQUARTERS OF THE ARMY,
ADJUTANT-GENERAL'S OFFICE,
Washington, February 12, 1879.

The following act of Congress is published for the information and government of all concerned:

AN ACT making an appropriation for the purchase of a site, and for the erection thereon of a military post, at El Paso, Texas.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the sum of forty thousand dollars, or so much thereof as may be necessary, is hereby appropriated for the purchase of the necessary grounds, and the erection thereon of a military post, at El Paso, Texas, to be expended under the direction of the Secretary of War: *Provided*, That before the expenditure of any of the appropriation hereby made, good and sufficient title shall be made to the United States for the land contemplated by this act.

Approved, February 4, 1879.

By command of General Sherman:

E. D. TOWNSEND,
Adjutant-General.

Memorandum agreement.

THE STATE OF TEXAS,
County of El Paso:

Know all men by these presents, that the United States of America, acting by Col. Edward Hatch, brevet major-general, U. S. A., of the first part, and the heirs of Simion Hart, deceased, of the second part, have entered into the following covenant and agreement, to wit: The party of the first part, for and in consideration of the grant of the land and privilege hereinafter mentioned, hereby agrees to pay to said Hart heirs the sum of one hundred dollars, and that said party of the first part will construct on said land a military post with funds now appropriated by act of Congress, approved February 4, 1879, for the purpose of purchasing a site and erecting a military post in El Paso County, State of Texas. The parties of the second part, or and in consideration of the payment of said sum of one hundred dollars, and the further consideration of building said military post as above stated, hereby agree to sell, convey, and release to the said party of the first part, by good and sufficient warranted deeds, the following described land and premises, to wit, one hundred acres of land, more or less, out of a tract of two hundred acres of land situated in El Paso County, State of Texas, and known as the Simion Hart homestead, bounded as follows: Commencing at a point on the Rio Grande where a line parallel to and 60 feet from the northern side of the dwelling-house of Hart, of Hart's Mill, now occupied by the sons, heirs of Simion Hart, intersects said river; thence in an easterly direction to the intersection of the eastern boundary line of Hart's survey No. 2, patent from State of Texas; thence north on said line 1,200 yards; thence westerly to a point 1,000 yards from where the western boundary of said tract intersects the Rio Grande; thence along left bank of said river to point of beginning. The party of the second part, for

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said consideration, further grants to said party of the first part the use of all water-power there may be required for working and furnishing water for the post by hydraulic ram.

LEONARDO S. HART,
Agent of the estate and guardian of minor heirs.
EDWARD HATCH,
Colonel Ninth Cavalry, Bvt. Major-General, U. S. A.

THE STATE OF TEXAS,
County of El Paso:

Know all men by these presents that I, Antonia Hart, of the State and county aforesaid, for and in consideration of fifty dollars, to me in hand paid by the United States of America, have granted, sold, and conveyed, and by these presents do grant, sell, and convey unto said United States of America all that certain tract or parcel of land described as follows, to wit: situated in the aforesaid State of Texas, county of El Paso, a part of pre-emption survey No. 2, in section No. 1, in said county, beginning at a stake which is six hundred and eighty and one-half varas north from a cottonwood tree, 12 inches in diameter, the southeast corner of the Simion Hart homestead survey, from which a cottonwood tree on the east bank of the Rio Grande River bears N. 70 E. 18 varas; thence north, with the east line of the Simion Hart homestead survey, seven hundred and eighty varas, to a rock mound, a large rock in mound marked "N. E. cor. U. S. Mil. Res."; thence, in a southwesterly direction, eight hundred and forty-five varas, to a rock mound on the north bank of a small arroyo on the east bank of the Rio Grande River, a large rock in center of mound marked "N. W. cor. U. S. Mil. Res."; thence east, three hundred and thirty-three varas, to the place of beginning. All of said description appears in a decree of partition among the heirs of Simion Hart, deceased, rendered in the district court of El Paso County, in State aforesaid, at the September term, A. D. 1879, on the 8th day of said month.

To have and to hold the above described premises, together with all and singular the rights and appurtenances thereto in anywise belonging, unto the said United States of America or the assigns of said government forever.

And I do hereby bind myself, my heirs, executors, and administrators to warrant and forever defend all and singular the said premises unto the United States of America and assigns, against every person whomsoever lawfully claiming or to claim the same, or any part thereof.

Witness my hand this 25th day of September, A. D. 1879.

ANTONIA HART.

Signed and delivered in presence of—
T. A. FALVEY.
LEOPOLD SENDER

THE STATE OF TEXAS,
County of El Paso:

Before me, Joseph Schultz, notary public in and for said El Paso County, on this day personally appeared Antonia Hart, known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that she executed the same for the purposes and considerations therein expressed.

Given under my hand and seal of office this 26th day of September, A. D. 1879.

[SEAL.] JOSEPH SCHULTZ,
Notary Public, El Paso County.

STATE OF TEXAS,
County of El Paso:

I, G. W. Wahl, clerk of the county court of El Paso County, certify that the foregoing instrument of writing was filed for record in my office January 27, 1880, at 2 o'clock p. m., and duly recorded February 7, 1880, at 12 o'clock m., in Book G, on pages 218 and 219.

Witness my official seal and signature the date last above written.

[SEAL.] G. W. WAHL,
Clerk of the County Court of El Paso County.

THE STATE OF TEXAS,
County of El Paso:

Know all men by these presents that I, Juan Hart, of Ulla, in the State of Colorado, by and through my attorney in fact, Leonardo Hart, of the aforesaid State of Texas, and county of El Paso, for and in consideration of the sum of fifty dollars, to me in hand paid by the United States of America, have granted, sold, and conveyed, and by

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these presents do grant, sell, and convey unto the said United States of America, all of that certain tract of land described as follows, to wit: Situated in the aforesaid State of Texas and county of El Paso, a part of pre-emption survey No. 2, in section No. 1, in said El Paso County, beginning at a stake set in the ground one hundred and forty-six and one-half varas north from a cottonwood tree 12 inches in diameter, the southeast corner of Simion Hart's homestead survey, from which a cottonwood tree on the east bank of Rio Grande River bears N. 70° E. 18 varas; thence north with the east line of Simion Hart's homestead survey five hundred and thirty-four varas to a stake; thence west three hundred and thirty-three varas to a rock mound on the north bank of a small arroyo, and east bank of the Rio Grande River, a large rock in center of mound marked "N. W. Cor. U. S. Mil. Res."; thence down the Rio Grande River, with its meanderings, to a large stake set in the ground marked "S. W. Cor. U. S. Mil. Res."; thence east two hundred and sixty-nine varas to the place of beginning. All of which description appears in a decree of partition among the heirs of Simion Hart, deceased, made by the district court of the aforesaid El Paso County, at the September term, A. D. 1879, on the 8th day of said month.

To have and to hold the above-described premises, together with all and singular the rights and appurtenances thereto in anywise belonging, unto the United States of America or the assigns of said government forever.

And I do hereby bind myself, my heirs, executors, and administrators to warrant and forever defend all and singular the said premises unto the said United States of America and assigns, against every person whomsoever lawfully claiming or to claim the same or any part thereof.

Witness my hand this September 25, 1879.

JUAN HART,
By his attorney in fact, LEONARDO HART.

Signed and delivered in presence of—
LEOPOLD SENDER.
T. A. FALVEY.

THE STATE OF TEXAS,
County of El Paso:

Before me, Joseph Schultz, notary public in and for said El Paso County, on this day appeared personally Leonardo Hart, the agent and attorney in fact of Juan Hart, duly appointed by power of attorney in writing, acknowledged and sealed according to law and to me exhibited, and said Leonardo Hart is known to me to be the person whose name is subscribed to the foregoing instrument, and he acknowledged to me that he signed and executed the same as above for the purposes and consideration therein expressed.

Given under my hand and seal of office this 26th day of September, A. D. 1879.

[SEAL.] JOSEPH SCHULTZ,
Notary Public, El Paso County.

I Know all men by these presents that I, Juan S. Hart, of the county of Lake and State of Colorado, have made, constituted, and appointed, and by these presents do make, constitute, and appoint Leonardo S. Hart, of El Paso County, Texas, my true and faithful attorney, for me and in my name, place, and stead, to enter upon and take possession of any and all property belonging to me in the State of Texas, both real and personal, and to grant, bargain, and sell the same, or any part and parcel thereof, at and for any price and upon any terms of payment he may deem best, and in my name to make, execute, and deliver all deeds of conveyance, and any and all papers necessary to complete any sale so made by him, and also to sign in my name any and all papers necessary and pertaining to the estate of Simeon Heart, deceased, and to represent my interest in said estate in any and all matters pertaining thereto; and to ask, demand, and receive any and all moneys due me or to become due me from said estate or by reason of any sale of property to me belonging in the State of Texas aforesaid, hereby giving and granting unto Leonardo S. Hart, my said attorney, full power and authority to do and perform all and every act and thing whatsoever requisite and necessary to be done in and about the premises, as fully, to all intents and purposes, as I might or could do if personally present, with full power of substitution and revocation, hereby ratifying and confirming all that my said attorney or his substitute shall lawfully do or cause to be done by virtue thereof.

In witness whereof I have hereunto set my hand and seal on the 31st day of March, one thousand eight hundred and seventy-nine.

JUAN S. HART. [SEAL.]

Sealed and delivered in presence of—
[SEAL.] PETER L. LABBE.

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STATE OF COLORADO,
County of Lake:

On the 31st day of March, 1879, before me, D. Houghton, a notary public in and of the county aforesaid, appeared Juan S. Hart, who is personally known to me to be the person whose name is subscribed to the foregoing power of attorney, and then acknowledged the execution thereof as his free act and deed for the purposes therein mentioned.

Given under my hand and notarial seal this 31st day of March, A. D. 1879.

[SEAL.] D. HOUGHTON,
Notary Public.

STATE OF TEXAS,
County of El Paso:

I, Leonardo S. Hart, attorney in fact for Juan S. Hart, do hereby authorize G. W. Wahl, clerk of the county court of El Paso County, to correct an omission of the word *west*, on the first page, twenty-seventh line (by inserting said word *west*), in a certain deed given by me, as said attorney in fact for said Juan S. Hart, to the United States of America, dated September 25, 1879, and ask that this authority be attached to said deed and made a part thereof.

Witness my hand this 27th day of January, 1880.

LEONARDO S. HART.

STATE OF TEXAS,
County of El Paso:

Before me, the undersigned authority, personally appeared Leonardo S. Hart, well-known to me, who acknowledges he signed the above instrument of writing for the purposes and considerations therein stated.

Witness my official seal and signature, at office in El Paso, Texas, this 27th day of January, A. D. 1880.

[SEAL.] ADOLP KRAKONIER,
Notary Public, El Paso County.

STATE OF TEXAS,
County of El Paso:

I, G. W. Wahl, clerk of the county court of El Paso County, do hereby certify that the above and foregoing instrument of writing was filed for record in my office January 27, A. D. 1880, at 2 o'clock p. m., and duly and correctly recorded February 7, A. D. 1880, at 11 a. m., in record book G, on pages Nos. 214, 215, 216, and 217.

Witness my official seal and signature, at office in Ysleta, the date last above written.

[SEAL.] G. W. WAHL,
Clerk County Court, El Paso County.

DEPARTMENT OF JUSTICE,
Washington, December 3, 1879.

SIR: I return herewith the papers which were received with your letter of the 30th of October last, in relation to the site of the new military post of Fort Bliss, Texas, and have the honor to state that in my opinion the accompanying deeds of conveyance to the United States from Juan Hart (by his attorney in fact Leonardo Hart) and Antonio Hart, dated each the 25th of September, 1879, pass a valid title to the land therein described.

I am, sir, very respectfully,

CHAS. DEVENS,
Attorney-General.

Hon. GEO. W. MCCRARY,
Secretary of War.

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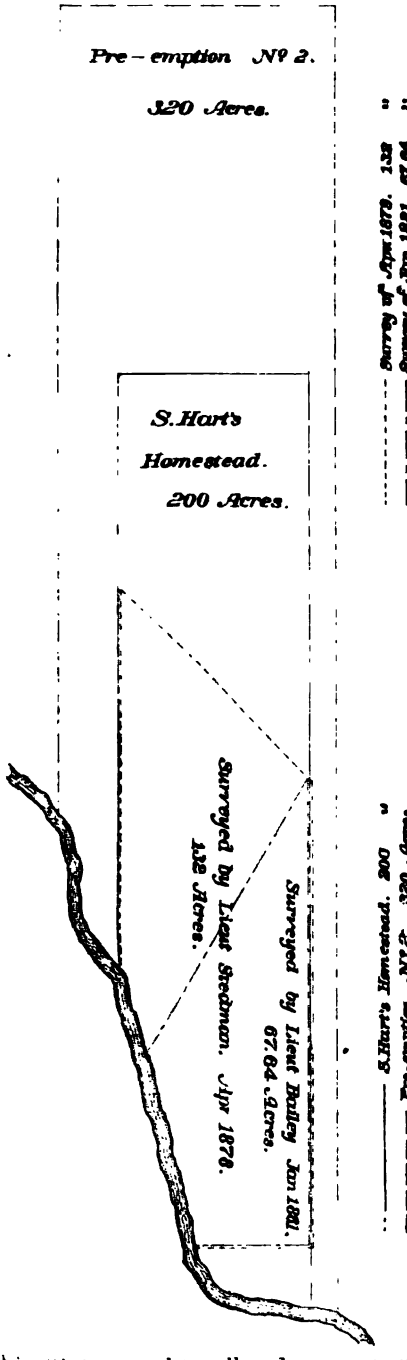
HEADQUARTERS DISTRICT OF NEW MEXICO,
ACTING ASSISTANT ADJUTANT-GENERAL'S OFFICE,
Santa Fé, N. Mex., February 9, 1881.

SIR: I have the honor to invite attention to the reservation of Fort Bliss, Texas, copy of plat inclosed.



The amount deeded is within the red [dotted] lines, and is 67.64 acres, the contract, which should cover the land appropriated. Contract inclosed with original papers, marked 8, was forwarded, called for land with the red [dotted] lines, containing 132 acres. This is the amount of land to which the government is entitled, and for which the parties should be held, and for the same $100 was paid. The Hart estate should be called upon to furnish deeds for 132 acres, the number agreed upon.

Copy of this communication will be referred to the commanding officer, Fort Bliss.

Very respectfully, your obedient servant,

EDWARD HATCH,
Colonel Ninth Cavalry, Commanding.

The ASSISTANT ADJUTANT-GENERAL,
Department of the Missouri,
Leavenworth, Kans.

WAR DEPARTMENT,
BUREAU OF MILITARY JUSTICE,
April 2, 1881.

SIR: Upon the question referred by you to me for opinion on the 29th ultimo, "whether the government can hold the parties to a further grant of land than 67.64 acres under the agreement between Colonel Hatch and L. S. Hart," for the conveyance of land for the site of the military post of Fort Bliss, near El Paso, Tex., authorized to be purchased by an act of February 4, 1879, I have the hono. to submit as follows: It appears to have been *originally* contemplated that the premises to be purchased and conveyed for the site of this post would embrace about *one hundred and thirty-two acres.* In the within report of May 5, 1879, addressed to the acting assistant adjutant-general, District of New Mexico, by First Lieut. C. A. Stedman, Ninth Cavalry, acting engineer officer of said district, who was intrusted by the district commander with the duty of examining locations for the proposed military post, it is stated, in referring to the land selected for the same: "*The proposed military reserve contains* 132 *acres,* 15 *square rods,* 17 *square yards, and* 1 *square foot.*" With this report is inclosed a survey made by Lieutenant Stedman, in which the lines of the proposed reserve are marked and located.

In the "Memorandum agreement," however (without date), signed by Brevet Major-General Hatch, as district commander, and Leonardo S. Hart, as agent of the estate and guardian of minor heirs, "it is agreed to sell and convey to the United States *one hundred acres of land,*

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more or less," of which a detailed description then follows. In forwarding this agreement to the department commander, under date of May 6, 1879, General Hatch states that "the survey did not materially change the agreement."

Pursuant to this agreement, formal deeds, dated September 25, 1879, have since been given, which, having been passed upon and approved as conveying a good title by the Attorney-General, have been duly recorded. Meanwhile, also, the State of Texas has, through its governor, relinquished to the United States jurisdiction over the lands described in the deeds.

Now, however, under date of February 9 last, General Hatch, district commander, has addressed the department commander as follows:

"I have the honor to invite attention to the reservation of Fort Bliss, Texas, copy of plat inclosed. The amount deeded is within the red lines and is 67.64 acres, the contract which should cover the land appropriated; contract inclosed with original papers marked 8 was forwarded, called for land within the dotted red lines containing 132 acres. This is the amount of land to which the government is entitled and for which the parties should be held, and for the same $100 was paid. The Hart estate should be called upon to furnish deeds for 132 acres, the number agreed upon."

This statement is too obscure and indefinite to form the basis of a satisfactory opinion. If, after contemplating or proposing a purchase of 132 acres, and agreeing to a purchase and sale of 100 acres, more or less, there has in fact been made a conveyance of but 67.64 acres, a very material mistake would seem to have been made, for which there appears no explanation. No error in the deeds was indicated when they were forwarded by General Hatch to the department commander on September 30, 1879, nor does any seem to have since been suspected, though the deeds have meanwhile been in sundry hands. But if a *mistake* was indeed made in the description of the premises, or if (though this would seem scarcely possible, in view of the fact that the consideration was *nominal* merely) there has been any *fraud* on the part of the grantors, there can, in my opinion, be little doubt that a court of equity would enforce the agreement according to the intent of the parties to the contract, and thus afford to the United States the proper relief. In view, however, of the obscurity which involves the case as presented by the papers furnished, I would suggest that before initiating any legal proceedings the Secretary of War direct the proper commander to confer amicably with the grantors or their representatives with a view—if a mistake has in fact been made in their deeds—to induce them to add a supplementary conveyance for the remainder of the land mutually understood to be contracted to be sold and transferred.

D. G. SWAIM,
Judge-Advocate-General.

Hon. ROBERT T. LINCOLN,
Secretary of War.

[Indorsement.]

Respectfully returned to the Adjutant-General.

The Secretary of War concurs in the within opinion, and directs that action be taken accordingly.

By order of the Secretary of War.

H. T. CROSBY,
Chief Clerk.

APRIL 6, 1881.

SANTA FÉ, N. MEX., *June* 24, 1881.

SIR: I have the honor to report that, in compliance with Special Orders No. 51, dated Headquarters District of New Mexico, Santa Fé, N. Mex., May 2, 1881, and letter of instructions from same source, bearing same date, I visited Fort Bliss, Texas, arriving there on the 9th ultimo.

Proceeding to the required business, I placed before Mr. Juan Hart, who, although the second son of Simeon Hart's heirs, will be the administrator of the Hart estates, the claims of the government, and found that he was not only willing to accede to the demands of the United States, but anxious that the matter in question should be satisfactorily arranged in accordance with the terms of agreement made between Brevet Major-General Hatch, representing the United States, and Leonardo S. Hart, representing the Hart heirs in 1879. At the time the papers pertaining to the military reservation at Fort Bliss were referred to me the case was understood to be this: that in the spring of 1879 the Hart heirs had agreed to convey to the United States a certain tract of their homestead estate, bounded by described lines, which were subsequently surveyed and located, and which contained 132 acres; that in the fall of the same year two adjoining tracts of the Hart homestead estate were conveyed to the United States, containing some 67 acres, by two of the said heirs, and which were supposed to be wholly included within the tract which had been previously surveyed and located by the government. The mission intrusted to me was to procure by sup-

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plementary deed from the Hart heirs the remaining 65 acres of the government survey, in completion of the original agreement. Upon investigating the matter, I found that the true facts were not known to the government.

In the original agreement (above referred to), the southern boundary of the property to be conveyed to the United States was to be an east and west line, located 60 feet north of the dwelling-house of the Hart heirs, and it was definitely understood between the contracting parties at the time the agreement was made that no portion of the dwelling-house or its appurtenances south of that line should be conveyed. It was ascertained upon investigation that the property already conveyed by Antonia and Juan Hart, heirs of Simeon Hart, ran so far south as to take in a large portion of their dwelling house, and to be 80 feet (more or less) south of that agreed upon and claimed by the government; that the deeds of the property transferred, of which the government holds the originals, and which agree with those recorded at Ysleta, county seat of El Paso County, are defective in description, and that if surveys were made in accordance therewith they must necessarily have been defective.

It was further ascertained that the land described in the vouchers of payment made to the grantors by the quartermaster at Fort Bliss did not correspond with that described in the deeds of the property conveyed (see Exhibit A, herewith inclosed) and the original deed by Juan Hart. Having ascertained the above facts, I addressed Juan Hart, May 13, 1881, and attention is respectfully invited to the correspondence (inclosures marked B and C). In connection with Mr. Hart's letter, a deed of the property, as originally surveyed by the government in 1879, and corresponding in field notes and description therein, was drawn up and tendered by the several heirs of Simeon Hart (see Exhibit D).

The question for adjustment is this: The government claims a certain tract, agreed by the Hart heirs to be conveyed to it; a portion of the said tract has been conveyed with other property, not contemplated and not intended to be conveyed by either party; that conveyed has become United States property, having been deeded by the Hart heirs and ceded by the State of Texas; the original deed of the property conveyed is defective; the grantors are willing to convey to the United States all the property claimed by the government, corresponding to the original agreement; they also ask that they be repossessed of that part of the Hart homestead estate erroneously deeded by them to the United States.

The solution of the problem is respectfully submitted to the proper authority. As the matter now stands, a great injustice will be done to the Hart heirs, and injury to the value of their homestead, unless it be rectified; and in this connection I would state that having been more or less intimately connected with the locating of the military post of Fort Bliss, I have ever found the Messrs. Hart, grantors of the site, most desirous to accommodate the government, just and upright in their dealings, and ambitious to meet all the requirements of their agreement; and the errors that have occurred in this matter, I can safely say, were occasioned through the force of circumstances, rather than fault of theirs.

Very respectfully, your obedient servant,

C. A. STEDMAN,
First Lieutenant and Adjutant, Ninth Cavalry.

ACTING-ASSISTANT ADJUTANT-GENERAL,
District of New Mexico, Santa Fé, N. Mex.

FORM NO. 9.—(Voucher to Abstract A.)

The United States to Antonia Hart, Dr.

Place and date of purchase.		Dollars.	Cts.
Fort Bliss, Texas, July 6th, 1880.	For a tract of land situated in El Paso County, Texas, described as follows, to wit: A part of pre-emption survey No. "2," in section No. 1, beginning at a stake, which is six hundred and eighty and one-half "varas" north from a cottonwood tree 12 inches in diameter, the SE. corner of the S. Hart homestead survey; thence north with the east line of S. Hart's homestead survey, seven hundred and eighty varas, to a rock mound; thence in a SW. direction eight hundred and forty-five varas to a rock mound; thence in a SW. direction eight hundred and forty-five varas to a rock mound of a small arroyo on the east bank of the Rio Grande River; thence three hundred and thirty-three varas to place of beginning.....	50	00
	Appropriation for construction of new post at Fort Bliss, Texas. Authority, G. O. No. 7, A. G. O., series 1879.		
		50	00

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I certify that the above account is correct and just, and that the articles have been accounted for on my property return for the quarter ending on the —— of ——188–.

GEORGE H. KINZIE,
1st Lieut., A. A. Quartermaster, 15th Inft'y.

Received at Fort Bliss, Texas, the 4th of September, 1880, of 1st Lieut. Geo. H. Kinzie, A. A. Quartermaster, 15th Inft'y, U. S. Army, the sum of fifty dollars and ——— cents, in full of the above account.

ANTONIA HART.

(Signed in duplicate.)

A true copy.

W. DAVIS,
1st Lt., 15th Inf., A. A. Q. M.

FORM No. 9.—(Voucher to Abstract A.)

The United States to Juan Hart. Dr.

Place and date of purchase.		Dollars.	Cts.
Fort Bliss, Texas. July 6th, 1880.	For a tract of land situated in El Paso County, Texas, described as follows, to wit: A part of pre-emption survey No. "2" in sec. No. "1," beginning at a stake in the ground one hundred and fifty-six and one-half varas north from a cottonwood tree 12 inches in diameter, the SE. corner of S. Hart's homestead survey; thence north with the east line of S. Hart's homestead survey five hundred and thirty-four varas to a stake; thence west three hundred and thirty-three varas to a rock mound on the north bank of a small arroyo and east bank of the Rio Grande; thence down the Rio Grande River with its meanderings to a large stake set in the ground; thence east two hundred and seventy-nine varas to the place of beginning.....	50	00
	Appropriation for construction of new post at Fort Bliss, Texas. Authority, S. O. No. 7, A. G. O., series 1879.		
		50	00

I certify that the above account is correct and just, and that the articles have been accounted for on my property return for the quarter ending on the —— of ——, 188–.

GEO. H. KINZIE,
1st Lieut., A. A. Quartermaster, 15th Inf.

Received at Fort Bliss, Texas, the 4th of September, 1880, of 1st Lieut. Geo. H. Kinzie, 15th Inf., A. A. Quartermaster, U. S. Army, the sum of fifty dollars and ——— cents, in full of the above account.

LEONARDO HART,
Attorney in fact for Juan Hart.

(Signed in duplicate.)

A true copy.

W. DAVIS,
1st Lt., 15th Inf., A. A. Q. M.

FORT BLISS, TEXAS, *May 13th*, 1881.

JUAN HART, Esq.,
Representing Simeon Hart's heirs, El Paso, Texas:

DEAR SIR: Referring to the conversation of yesterday concerning the military reservation at Fort Bliss, I have the honor, on behalf of the government, to respectfully request that you will inform me of what action you will take in the matter in question between the United States and the grantors of the property on which the military reservation is located.

In brief exposition of the case, the following facts are given:

In March, 1879, articles of agreement concerning the transfer of real estate, for the location and erection of a military post at or near El Paso, were entered into by L. S. Hart, representing Simeon Hart's heirs, and Brevet Major-General Edward Hatch, U. S. A., representing the United States, of which you have a copy.

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In April, 1879, as per this agreement, subsequently modified by the mutual consent of the contracting parties, the property was surveyed and the lines located. The property contained 132+ acres. Of this property, and in partial fulfillment of the agreement above referred to, Antonia Hart and Juan Hart, heirs of Simeon Hart, deeded and conveyed to the United States, January 27, 1880, two adjoining tracts containing 67$\frac{64}{100}$ acres, deeds of which are duly recorded at Ysleta, Texas, county seat of El Paso Co., and of which you have the original deeds.

The government now requests that you will take such action that the terms of the agreement between Leonardo S. Hart and Bvt. Major-General E. Hatch, be fully carried out, and the land still due to the U. S. conveyed by supplementary deeds.

I am, sir, with respect, your obedient servant,

C. A. STEDMAN,
1st Lt. and Adjutant 9th Cavalry, U. S. A.

A true copy:

C. A. STEDMAN,
1st Lieut. and Adjt. 9th Cav'ly.

HART'S MILLS,
El Paso, Texas, May 16th, 1881.

First Lieut. C. A. STEDMAN,
Adj't 9th Cavalry, U. S. A.:

DEAR SIR: Your communication of the 13th instant, in reference to the military reservation at Fort Bliss, received. In answer I have the honor to state in behalf of those concerned, the heirs of Simeon Hart, my father, that we desire and shall do all in our power to carry out fully the terms of agreement made between Gen'l Hatch and our lamented brother Leonardo.

But I wish to call your attention to a fact which you can by investigation find correct, and which also is in conflict with the terms of agreement referred to as well as the insufficient area of the reservation.

I was absent from home in April, 1879, when the government ordered a survey of the grounds, and I have only recently arrived, and naturally enough I examined our land lines and find that, according to the deeds made by us to the U. S., the southern boundary of the reservation runs through our home, leaving a small part of the house within the reserve. The agreement calls for sixty feet north of the house, and the surveys made both by yourself and Lieut. T. N. Bailey, in behalf of the government, placed the southern boundary at the required distance from the house, as the stake on the river bank, the openings in the adobe walls of the corral, and other marks, will show.

The error in the deeds which makes the property conveyed not what it was the intention to convey, is the description of the initial point in the survey of the reservation, which is said to be one hundred and forty-six and one-half (146½) varas distant from and north of the initial point in our homestead survey, a cottonwood tree on the river bank. This call is wrong according to all surveys made of the fort grounds. And I find, further, that this call reads 156½ varas in a document (in the hands of the quartermaster here at Fort Bliss) entitled "Copy of Voucher No. 2, Abstract 'A,' September, 1880, Lieut. Geo. H. Kinzie, 15th Inf., A. A. Q. M., Fort Bliss, Texas." This increase of ten varas is also incorrect, as will be found.

The area 132+ acres, according to the first survey made, is complete and entire without passing beyond the sixty feet we reserved north of our house. So likewise is the area of 67.64 acres, according to the second survey made, complete, and entire without passing that line.

The cause of the whole complication is that after the government made the first survey, and before plat and field notes of said survey reached my brother Leonardo, so that the deeds might be made in conformity with the survey, he was urged by telegraph to hasten the deeds. This necessitated a survey to describe the property in the deeds. A man named Peck was the only available surveyor; he run the lines of the grounds directly over the stakes and stones set by yourself, in behalf of the government, in the first survey. He found the SW., the SE., and the NE. corners of the survey, but, having nothing to guide him further, he run a SW. course from the NE. corner instead of a NW. course, which has caused the difference in area of the two surveys. The incompetency of Peck, as an examination of his field notes will show, caused the error in the 146½-vara call.

It is our earnest wish that since the government has accepted a survey which it never examined, and the inaccuracy of which you can attest, that the matter be laid before the proper authorities, in order that the original agreement may be strictly carried out, giving the government what it can justly claim and reserving to us our house and property, which it was never the intention of the United States, through its representatives, to take from us, nor of ourselves, through our much lamented brother, to part with.

I ask you that the course of adjustment be promptly made known to us, and we are ready to conform.

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Regretting that circumstances have made this matter so unpleasant to all concerned,

I remain, very respectfully, your obedient servant,

JUAN S. HART.

STATE OF TEXAS,
County of El Paso:

This is to certify that Antonia Hart was, on the 17th day of January, A. D. 1881, at a regular term of the probate court, appointed guardian of the person and estate of Paulina Hart, minor child of Simeon Hart, deceased; that he gave bond and took the oath on the same day, and is, therefore, fully authorized to perform all the duties incumbent upon him as such guardian according to law.

Witness my hand and official signature at Ysleta, Texas, this 20th day of June, A. D. 1881.

[SEAL.] MANUEL E. FLORER,
Clk. C. C., E. Paso Co.

STATE OF TEXAS,
County of El Paso:

This is to certify that Antonia Hart, on the 17th day of January, A. D. 1881, it being a regular term of the probate court, was appointed by the honorable court administrator of the estate of Leonardo Hart, deceased; that he qualified as such the same day, and is hereby authorized to perform all the duties incumbent upon him as such administrator according to law.

Witness my hand and official signature at Ysleta, Texas, this 20th day of June, A. D. 1881.

[SEAL.] MANUEL E. FLORER,
Clk. C. C., E. Paso Co.

STATE OF TEXAS,
County of El Paso:

Know all men by these presents that we, Leonardo S. Hart, deceased, by his administrator, Antonia S. Hart, by authority of court, order herewith annexed, Antonia S. Hart, Juan S. Hart, Clara S. Hart, Corina S. Hart, Mrs. G. K. McGunnegle, and Paulina S. Hart, through her guardian, Antonia S. Hart, by authority of court, order herewith annexed, of the said State and county aforesaid, for and in consideration of one hundred ($100.00) dollars to us in hand and already paid by the United States of America, have granted, sold and conveyed, and by these presents do grant, sell, and convey unto said United States of America, all that certain tract or parcel of land described as follows, to wit: Situated in the aforesaid State of Texas and county of El Paso, a part of pre-emption survey No. 2, in said county, beginning at a stone post marked "S. E. corner U. S. M. R." planted in the ground and five hundred thirteen and thirty-eight hundredths ($513\frac{38}{100}$) feet ($=184\frac{33}{100}$ varas) from and north of a cottonwood tree twelve inches in diameter, the southeast corner of the Simeon Hart homestead survey, from which a cottonwood tree on the east bank of the Rio Grande bears N. 70°, E. eighteen (18) varas ($=50\frac{8}{100}$); thence north with the eastern line of the Simeon Hart homestead survey three thousand and six hundred (3,600) feet ($=1{,}293\frac{98}{100}$ vrs.) to a rock mound, a large rock in mound marked "U. S. M. R."; thence north 42° 6′ 25° west, two thousand one hundred sixty-one and ninety-seven hundredths ($2{,}161\frac{97}{100}$) feet ($=777\frac{1}{10}$ vrs.) to a rock mound, a large rock in mound marked "U. S. M. R."; thence south (3,000) three thousand ($=1{,}078\frac{35}{100}$ vrs.) to the intersection of this north-and-south line with the Rio Grande, located by a stone post planted in the ground on the left bank of said river and marked "U. S. M. R."; thence down the Rio Grande with its meanderings to a stone post planted in the ground on the left bank of said river and marked "U. S. M. R."; thence east eight hundred fifty-four and seven-tenths ($854\frac{7}{10}$) feet ($=307\frac{21}{100}$ vrs.) to the point beginning. To have and to hold the above-described premises together with all and singular the rights and appurtenances thereunto in any wise belonging unto the said United States of America, or the assigns of the said United States of America, forever.

And we do hereby bind ourselves, our heirs, executors, and administrators to warrant and forever defend all and singular the said premises unto the said United States of America and assigns against every person whomsoever lawfully claiming or to claim the same or any part thereof.

Witness our hand and signatures given this 27 day of May, 1881.

LEONARDO HART.
By his administrator ANTONIA HART.
A. S. HART. [SEAL.]
JUAN S. HART. [SEAL.]
CLARA S. HART. [SEAL.]
CORINA S. HART. [SEAL.]
Mrs. G. K. McGUNNEGLE, *née* CAROLINA HART. [SEAL.]
PAULINE HART.
By her guardian ANTONIA HART.

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Acknowledged and signed in my presence by A. S. Hart, Juan Hart, Clara Hart, Corina Hart, Mrs. G. K. McGunnegle, *née* Carolina Hart, Leonardo Hart, by Antonia Hart, his administrator, Paulina Hart, by her guardian, Antonia Hart.
This 27th day of May, A. D. 1881.
[SEAL.]

JOHN G. FIEDEKE,
Notary Public, El Paso Co., Texas.

Signed & delivered in presence of—
S. L. KAHN,
El Paso, Texas.

WAR DEPARTMENT,
BUREAU OF MILITARY JUSTICE,
Washington, October 6th, 1881.

Respectfully returned to the Secretary of War.

This matter appears to stand as follows: A tract of land described by metes and bounds, supposed to contain 132 acres, was conveyed to the United States for the purpose of a military reservation and post near El Paso, Tex. The title and conveyances to the land were accepted by the United States, the purchase money (a mere nominal sum) paid, the deeds recorded, and a cession of jurisdiction over the lands described in the conveyances was made to the United States by the State of Texas. Shortly after these solemnities it transpired that the quantity of land embraced by the metes and bounds contained in the conveyances amounted to about 67 instead of 132 acres. The matter at this point was referred to this bureau, and it was advised that the grantors be conferred with, with a view to induce them to make up the deficiency by supplementary conveyance. This conference was had, and it is now ascertained that the person who represented the owners of the tract of land, and who made the conveyances above stated, being himself a part owner, has since deceased, and it is now claimed by the survivors that the tract of land embraced in the conveyances above referred to was not the exact tract of land intended to be conveyed to the United States. They agree, however, to convey the land originally contemplated by the parties to be conveyed for this military post, but by a relocation of the boundary lines, provided they be "repossessed of the estate erroneously deeded" by them to the United States as above stated, and have accordingly executed a deed which they now submit for acceptance upon the terms stated. The errors of description claimed by the grantors are admitted by the officers who have examined into the affair in the district of New Mexico. The error seems to have occurred as follows: The district commander having selected the site for the post upon the land of these grantors, and having, with their assent, approximately fixed upon temporary boundary lines with reference to the homestead mansion of the grantors (no part of which was intended to be included in the conveyance), and before the boundary lines were definitely located and noted so as to enable a proper description of the premises to be given in a deed, the military authorities called for an immediate submission of the title, papers, and conveyances. There being but one surveyor present (who it seems was an incompetent one), and the grantors being desirous of complying with the call of the military authorities, employed this person to establish the metes and bounds of the land. The lines were erroneously run, and embraced land not intended to be conveyed, one of the boundary lines passing through the homestead mansion of the grantors. With this exception it is presumed that the lines bounding the 132 acres said to be contained in the deed now submitted do not vary much from those contained in the prior deeds now shown to be erroneous; nor is it supposed that the land differs materially in quality or value, except so much as underlies the house and curtilage.

I know of no authority, however, by which a formal reconveyance of the land, erroneously embraced in the previous deeds, can be made by any official; but if the amended conveyance was made to recite the inducements to the making of it, by stating therein the error in the previous conveyances, the amended deed to be approved by the Attorney-General and the Secretary of War, then to be recorded, and that portion of the land embraced by the erroneous deeds, but not by the amended deed, to be immediately relinquished to the grantors—this, if satisfactory to them, I think would adjust the matter as it now stands.

D. G. SWAIM,
Judge-Advocate-General.

True copies.

JAS. M. MOORE,
Quartermaster, U. S. A.

QUARTERMASTER-GENERAL'S OFFICE, *January* 21, 1882.

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HEADQUARTERS DEPARTMENT OF THE MISSOURI,
Fort Leavenworth, Kans., September 13, 1882.

COLONEL: Attention is respectfully invited to the advisability of prompt action in the matter of the military reservation of Fort Bliss, Texas. The property is rapidly increasing in value.

I am, colonel, very respectfully, your obedient servant,

JOHN POPE,
Brevet Major-General Commanding.

Col. R. WILLIAMS,
Assistant Adjutant-General,
Headquarters Military Division of the Missouri, Chicago, Ill.

[Indorsements.]

HEADQUARTERS MILITARY DIVISION MISSOURI,
Chicago, September 30, 1882.

Respectfully forwarded to the Adjutant-General of the Army.

I cannot too strongly urge prompt action in this matter, as desired by General Pope.

P. H. SHERIDAN,
Lieutenant-General Commanding.

ADJUTANT-GENERAL'S OFFICE,
Washington, October 6, 1882.

Respectfully submitted to the General of the Army.

Under the provisions of the act of Congress approved February 4, 1879, appropriating $40,000 for the purchase of a site and the erection thereon of a military post at El Paso, Texas, an agreement was entered into between General Hatch, Ninth Cavalry, on the part of the United States, and the heirs of Simeon Hart (deceased) for the purchase of about 132 acres of land, being part of a larger tract owned by the heirs, and situated on the Rio Grande near El Paso.

Transfer deeds were duly executed, submitted to, and approved by the Attorney-General, and recorded in the proper county of the State of Texas, which State also ceded jurisdiction to the United States, and the present post of Fort Bliss was erected on the land so conveyed.

Subsequently it was ascertained that the transfer deeds, by reason of erroneous descriptions, failed to convey to the United States certain lands intended to be conveyed, while certain other land not intended to be conveyed was in fact embraced therein, and the matter was submitted to Congress by the President, February 8, 1882, with the draft of an act to rectify and establish the title of the United States, the heirs in the mean time having tendered to the United States a new deed of the tract contemplated by the original agreement, stipulating only that they should be repossessed of the land erroneously conveyed.

The facts connected with the subject are fully set forth in the accompanying Senate Ex. Doc. No. 96, Forty-seventh Congress, first session.

Congress at its last session appropriated $5,000 to open and construct approaches to Fort Bliss (see sundry civil bill, published in General Orders No. 102, Adjutant-General's Office, 1882), but, so far as this office is advised, the remedial legislation asked for to perfect the title to the land has not yet received the sanction of that body. The commanding general, Department of the Missouri, under date of September 13, 1882, calls attention to the advisability of prompt action in the matter, as the property is rapidly increasing in value, and in this connection the Lieutenant-General remarks: "I cannot too strongly urge prompt action in this matter, as desired by General Pope."

R. C. DRUM,
Adjutant-General.

HEADQUARTERS OF THE ARMY,
Washington, October 6, 1882.

Respectfully submitted to the Hon. Secretary of War. So far as I know the land on which Fort Bliss is situated has a good and sufficient title. I think, however, the government should buy of Hart's heirs the mill site next south of and in contact with Fort Bliss. I don't know what action General Pope advises. The new deed in place of the old or former deed has been accepted and is recorded.

W. T. SHERMAN, *General.*

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47TH CONGRESS, 2d Session. | SENATE. | Ex. Doc. No. 4.

MESSAGE

FROM THE

PRESIDENT OF THE UNITED STATES,

TRANSMITTING

A communication from the Secretary of War, setting forth certain facts respecting the title to the peninsula of Presque Isle, at Erie, Pa., &c.

DECEMBER 6, 1882.—Read and referred to the Committee on Military Affairs and ordered to be printed.

To the Senate and House of Representatives:

I transmit herewith a communication from the Secretary of War, dated the 4th instant, setting forth certain facts respecting the title to the peninsula of Presque Isle, at Erie, Pa., and recommending that the subject be presented to Congress with the view to legislation by that body modifying the act of May 27, 1882, entitled "An act to authorize the Secretary of War to accept the peninsula in Lake Erie, opposite the harbor of Erie, in the State of Pennsylvania" (17 Stats., p. 162), so as to authorize the Secretary of War to accept the title to said peninsula proffered by the marine hospital of Pennsylvania, pursuant to an act of the legislature of that State, approved by the governor May 11, 1871.

CHESTER A. ARTHUR.

EXECUTIVE MANSION, *December* 6, 1882.

WAR DEPARTMENT,
Washington City, December 4, 1882.

SIR: By an act of the legislature of the State of Pennsylvania, approved by the governor on May 11, 1871, an appropriation of the sum of $30,000 was made for the benefit of the marine hospital of Pennsylvania at Erie, Pa., one of the conditions of the appropriation being thus expressed:

And on the further condition that said marine hospital corporation shall convey to the United States of America all title it may have to the peninsula of Presque Isle, obtained from the State of Pennsylvania by act of February fourth, anno Domini one thousand eight hundred and sixty-nine, entitled "A supplement to an act incorporating the marine hospital at Erie," to be held by said United States, as near as may be, in its present condition, and only for the purposes of national defense and for the protection of the harbor of Erie, but in all other respects to be subject to the civil and criminal jurisdiction of the State of Pennsylvania, and the consent of the State of Pennsylvania is hereby given to such transfer of title only for the purposes and under the limitations hereinbefore mentioned.

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By an act approved May 27, 1872, Congress authorized the Secretary of War to accept said land with the following provisions:

Provided, That the deed conveying the same shall not be received or accepted until the title to the same is complete and indefeasible, nor unless the acceptance thereof shall be recommended by a board of officers of the Corps of Engineers appointed by the President (17 Stat., p. 162).

A Board of Officers of the Corps of Engineers convened in accordance with the foregoing provisions reported July 9, 1873:

That, whereas the Presque Isle peninsula at Erie, Pa., is in constant need of protection by the government to prevent its being breached by the action of the waves in storms; and whereas it is also valuable in part for light-house purposes, and is now so occupied by the United States; and whereas it appears that at present it is not only the resort of disorderly persons, but subject to depredations by cutting of timber and otherwise, thereby endangering its maintenance as a protection to the harbor of Erie:

We respectfully recommend that the United States accept the title to this peninsula from the marine hospital of the State of Pennsylvania, that it be placed in the custody of the Engineer Department, United States Army, so far as relates to the preservation of the land from change by cutting trees, carrying away sand, or otherwise interfering with the natural features of the peninsula, and that no such change should be permitted to be made without authority from the Chief of Engineers, U. S. A., &c.

The deed to the land in question proffered by the marine hospital pursuant to the above mentioned act of the legislature of Pennsylvania of May 11, 1871, not having been accepted, the subject was, under date of May 2, 1882, submitted by this department to the honorable the Attorney-General, with request that, if said deed be found to be properly drawn and conveyed to the United States a complete and indefeasible title, the proper United States district attorney be instructed to assist the United States Engineer officer in charge of the public works at Erie in procuring an abstract of the title held by the marine hospital of Pennsylvania at the date of the deed, and such other papers as were necessary in the premises.

The matter was accordingly referred to the United States district attorney for the western district of Pennsylvania, who, under date of October 31, last, submitted a report in which he expressed the view—concurred in by the honorable the Attorney-General—that under the provisions of the above cited act of Congress of May 27, 1872, the Secretary of War cannot accept the deed proffered by the marine hospital corporation.

In consideration of these facts and of the importance of the peninsula of Presque Isle in connection with the improvement and maintenance of the harbor of Erie, Pa., I have the honor to recommend that the subject be presented to Congress, with the view to legislation modifying the aforementioned act of May 27, 1872, so as to authorize the Secretary of War to accept the title to the land as offered by the marine hospital, if such legislation shall seem proper to Congress.

Very respectfully, your obedient servant,

ROBT. T. LINCOLN,
Secretary of War.

The PRESIDENT.

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started by locomotives or other agency of said company, or in any other manner by reason of the operation of said railroad upon the reservation; such losses or damages, in case the parties in interest fail to agree between themselves, to be ascertained and appraised by a board of arbitrators, composed of the United States agent for said Indians for the time being, the superintendent of said railroad company, and a third person to be mutually selected by them, and who shall be paid by said company; the decision of said arbitrators or any two of them, when approved by the Commissioner of Indian Affairs, to be conclusive and binding in the premises.

"And the said Carson and Colorado Railroad Company further agrees that it will not at any time give any license, permission, or countenance to any person to keep, sell, barter, dispose of, or give away any spirituous, vinous, fermented, or intoxicating liquors of any kind, or any of its right-of-way or station grounds within the boundaries of said reservation; but, on the contrary, will use its influence and authority to prevent any such use or traffic in any of said liquors. And further, that it will at all times observe, aid, and assist in the enforcement of the Indian intercourse laws, and the rules and regulations prescribed or to be prescribed from time to time by the Secretary of the Interior for the benefit and protection of said Indians.

"The said company further agrees that it will immediately upon the execution of his agreement make and execute unto the United States, for the use of said Indians, a bond with two good and sufficient sureties to be approved by the Secretary of the Interior, in the penal sum of twenty thousand dollars ($20,000), conditioned for the faithful performance of the several covenants, conditions, agreements and stipulations contained in this agreement, and which on the part of said railroad company should be performed and fulfilled.

"And the said Indians, parties hereto, promise and agree that they will at all times protect the said Carson and Colorado Railroad Company and its employés and property in the peaceful construction, repair, and operation of said railroad through the Walker River Reservation.

"It is agreed and understood that the foregoing grants, stipulations, and agreements shall include and be binding upon the successor and assigns of the said railroad company as fully as though previously named herein.

"This agreement is made subject to final ratification thereof by Congress."

SEC. 2. That whenever the lands the use and occupancy whereof is hereby granted shall cease to be used for the purposes of the said railroad company, its successors or assigns, the same shall revert to the United States.

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47TH CONGRESS, 2d Session. | SENATE. | Ex. Doc. No. 7.

MESSAGE

FROM THE

PRESIDENT OF THE UNITED STATES,

TRANSMITTING

A communication from the Secretary of the Interior relating to an agreement made by the Pah-Ute Indians, and granting a right of way to the Carson and Colorado Railroad Company through the Walker River Reservation, in Nevada.

DECEMBER 8, 1882.—Read and referred to the Committee on Indian Affairs and ordered to be printed.

To the Senate and House of Representatives:

I transmit herewith a communication from the Secretary of the Interior, with a draft of a bill and accompanying papers, to accept and ratify an agreement made by the Pah-Ute Indians, and granting a right of way to the Carson and Colorado Railroad Company through the Walker River Reservation, in Nevada.

The subject is presented for the consideration of Congress.

CHESTER A. ARTHUR.

EXECUTIVE MANSION, *December* 8, 1882.

DEPARTMENT OF THE INTERIOR,
Washington, December 6, 1882.

SIR: I have the honor to submit herewith, for your consideration, a draft of a bill prepared in the Office of Indian Affairs, "to accept and ratify an agreement made by the Pah-Ute Indians, and granting a right of way to the Carson and Colorado Railroad Company through the Walker River Reservation, in Nevada," together with a copy of the letter of the Commissioner of Indian Affairs, transmitting said draft of bill to the department.

The measure has my approval, and I respectfully request that it may be transmitted for the consideration of Congress.

I have the honor to be, sir, very respectfully, your obedient servant,

H. M. TELLER,
Secretary.

The PRESIDENT.

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DEPARTMENT OF THE INTERIOR,
OFFICE OF INDIAN AFFAIRS,
Washington, December 4, 1882.

SIR: In compliance with the instructions contained in department letter of the 21st ultimo, I have the honor to submit herewith the draught of a bill to confirm the agreement made with the Pah-Ute Indians on the 9th of August last, and to grant a right of way to the Carson and Colorado Railroad Company through the Walker River Reservation, in Nevada.

In submitting this bill it may be convenient, for the information of Congress, to give a brief history of the proceedings anterior to the date of the agreement in question.

The Walker River Reservation is a tract of public land withdrawn from sale and set apart for the use of the Pah-Ute Indians by Executive order, dated March 19, 1874. The Indians are mere tenants at will, and possess no permanent rights in the reservation.

At a special council of the Pah-Utes, held on the Walker River Reserve April 13, 1880, said Indians resolved, in consideration of $750 coin paid to their agent by D. O. Mills and associates, with the privilege of free transportation for themselves, their fish, game, &c., over the road, to grant to said Mills and associates a right of way through the Walker River Reserve for a line of railroad in accordance with a survery then in progress. Afterwards D. O. Mills and associates were incorporated under the laws of Nevada as the Carson and Colorado Railroad Company, with power to construct a railroad from the Mound House Station, on the line of the Virginia and Truckee Railroad, in the county of Lyon and State of Nevada, to Candalaria, in the county of Esmeralda and State aforesaid, and proofs of the due organization of said company were duly filed with and accepted by this department.

January 5, 1881, the said railroad company filed in this department, under the right-of-way act of March 3, 1875, a map showing the definite location of its line from the Mound House, in section 31, township 16 north, range 21 east, to a point in the northeast quarter section 14, township 8 north, range 31 east, Monte Diablo meridian, a distance of 106.882 miles, passing southwardly through the Walker River Reservation for a distance of 45 miles or thereabouts, which said map was duly approved and accepted by your predecessor in office, January 29, 1881.

Pending approval by this department of the action of the Indians in granting the right of way, the Carson and Colorado Railroad Company, believing that it had honestly and in good faith complied with all legal requirements, proceeded to construct its road upon the reservation, and the same has been completed and in active operation for some time past.

Section 5 of the right-of-way act of March 3, 1875 (18 Stats., 482), expressly excepting Indian reservations or other lands specially reserved from sale from the operation of the act, "unless such right of way shall be provided for by treaty stipulations or by act of Congress heretofore passed," and, no such provision being extant in the case of the Walker River Reservation (which, as before stated, was created by Executive order), it appeared to this office that the authority to grant a right of way through the reservation to the Carson and Colorado Railroad Company rested in Congress alone, and on the 19th October, 1881, the question was submitted to the department for instructions.

By department letter of March 13 last, this office was instructed to prepare and procure the execution, by the Pah-Ute Indians (with the approval of the Secretary of the Interior) and by the said railroad

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company, of a formal agreement for a right of way upon the basis of the terms contained in the resolution adopted by the Indians in council, hereinbefore referred to; also to procure a bond from the company in a sum sufficient to insure a compliance with the stipulations contained in such agreement on its part to be fulfilled and kept, and thereafter to prepare and present a draft of the legislation necessary to a ratification of the agreement by Congress.

In pursuance of these instructions the necessary agreement was prepared and executed by the chiefs, headmen, and heads of a majority of families of the Pah-Ute Indians occupying said reservation, and by the duly authorized officers of the railroad company, under its corporate seal, on the 9th day of August last. Under date of October 4 last the company also executed and delivered a bond, with two approved sureties, to the United States for the use and benefit of said Indians, in the penal sum of $20,000, conditioned for the faithful performance of said agreement. Said agreement and bond, with maps of grounds required for station purposes, &c., were duly approved by you on the 21st ultimo. I have the honor, therefore, to recommend that the accompanying draft of a bill to ratify said agreement and to grant a right of way to said railroad company through the Walker River Reservation be transmitted to Congress for its action.

Duplicate copies of said bill and of this report are herewith inclosed.

Very respectfully, your obedient servant,

H. PRICE,
Commissioner.

The Hon. the SECRETARY OF THE INTERIOR.

A BILL to accept and ratify an agreement made by the Pah-Ute Indians, and granting a right of way to the Carson and Colorado Railroad Company through the Walker River Reservation, in Nevada.

Be it enacted by the Senate and House of Representatives of the United States of America, in Congress assembled, That a certain agreement now on file in the Department of the Interior, bearing date the 9th day of August, 1882, made between the Pah-Ute Indians, occupying the Walker River Reservation, in the State of Nevada, acting under the supervision and by and with the approval of the Secretary of the Interior, of the one part, and the Carson and Colorado Railroad Company, a corporation organized under the laws of the State of Nevada, of the other part, be, and the same is hereby, ratified and confirmed; and that a right of way, not exceeding 60 feet in width, through said reservation, with grounds for stations, &c., according to the approved plans of route and survey now on file in the Department of the Interior, be, and the same is hereby, granted to the said Carson and Colorado Railroad Company, its successors and assigns. Said agreement is executed by the chiefs, headmen, and heads of a majority of families of the Pah-Ute tribe of Indians, resident upon said reservation, and by the said Carson and Colorado Railroad Company, under its corporate seal, and is in the words and figures following, that is to say:

"Whereas, by an Executive Order dated March 19, 1874, a certain reservation situate on Walker River, Nevada, as surveyed by Eugene Monroe, December, 1864, and indicated by red lines on the diagram thereof (on file in the Office of Commissioner of Indian Affairs), in accordance with the fifteen courses and distances thereon given, was withdrawn from public sale or other disposition, and set apart for the use of the Pah-Ute Indians residing thereon;

"And whereas, at a special council of the Pah-Ute Indians held at the Walker River Reservation on the 13th day of April, 1880, it was resolved that in consideration of the sum of seven hundred and fifty dollars ($750) in coin paid into the hands of the United States Indian agent, acting in behalf of said Indians, by D. O. Mills and associates, together with the privilege of free transportation of the persons, fish, game, &c., of said Indians over said railroad, said Indians grant forever unto said D. O. Mills and associates a right of way over and across the Walker River Reservation, for a line of railroad in accordance with a survey then being made and to be made by said D. O. Mills and associates;

"And whereas the said D. O. Mills and associates have since been incorporated

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under the laws of the State of Nevada, under the name and title of the Carson and Colorado Railroad Company, with power to construct a railroad from the Mound House station, on the line of the Virginia and Truckee Railroad, in the county of Lyon and State of Nevada, to Candalaria, in the county of Esmeralda, and State aforesaid, and proofs of the due organization of said company have been duly filed with and accepted by the Department of the Interior;

"And whereas the said Carson and Colorado Railroad Company, some time since, applied to the Secretary of the Interior for authority to continue the work of construction of said railroad over and through the Walker River Reservation, and did on the fifth day of January, 1881, file in said department a map showing the definite location of its line of road from the Mound House, in section 31, township 16 north, range 21 east, to a point in the NE. ¼ of section 14, township 8 north, range 31 east, Monte Diablo meridian, a distance of 106.882 miles, passing southwardly through said reservation for a distance of forty-five (45) miles, or thereabouts, which said map was duly approved and accepted by the Secretary of the Interior, on the 29th day of January, 1881;

"And whereas, pending approval by the Secretary of the Interior of the action of said Indians, the said Carson and Colorado Railroad Company, believing that it had honestly and in good faith complied with all legal requirements, proceeded to construct its road through said reservation, and the same is now completed and in active operation:

"Now, therefore, for the purpose of carrying into effect said resolution of the Indians, and for the more effectually securing and confirming to the said Carson and Colorado Railroad Company a right of way through said reservation,

"This agreement, made this ninth day of August, A. D. 1882, by and between the chiefs, headmen, and heads of a majority of families of the Pah-Ute tribe of Indians, occupying the Walker River Reservation, in the State of Nevada, acting under the supervision and by and with the approval of the Secretary of the Interior of the one part, and the Carson and Colorado Railroad Company, a corporation of the State of Nevada, of the other part, witnesseth as follows:

"That for and in consideration of the sum of seven hundred and fifty dollars coin ($750), paid by the Carson and Colorado Railroad Company to the United States Indian agent for the use and benefit of said Indians, parties hereto (the receipt whereof is hereby acknowledged), they, the said Indians, do hereby grant unto the said Carson and Colorado Railroad Company, its successors and assigns, the right to use and occupy a strip of land not exceeding sixty feet (60) in width on the main line of road as now constructed by the said Carson and Colorado Railroad Company extending over and across the Walker River Reservation, in Nevada, as the same is more particularly delineated upon the map of definite location hereinbefore referred to, an official copy whereof, marked with the letter A, is now produced and shown said Indians, and is intended to form a part of this agreement, said strip of land to be used by said Carson and Colorado Railroad Company as a right of way and road-bed, and for no other purpose.

"And for the considerations aforesaid, the said Indians do hereby further grant unto the said Carson and Colorado Railroad Company, their successors and assigns, the right to use and occupy for the purposes of section house, stations, siding, water tanks, &c., the several plots or parcels of land situate along and adjoining the said right of way as the same are delineated upon the four (4) several official plats thereof, marked respectively with the letters B, C, D, E, now produced and shown to said Indians and intended also to form a part of this agreement, said plots of land containing, respectively, the following areas, that is to say—

	Acres.
"(B) Rio Vista	22,956
"(C) Schurz	3,445
"(D) Gillis	22,956
"(E) Sunrise	22,956

"And the said Carson and Colorado Railroad Company agrees that it will at all times hereafter so long as the right of way and lands the use and occupancy whereof is hereby granted shall be included within the boundaries of the Walker River Reservation, furnish the Indians resident thereon with free transportation for themselves, their fish, game, and products to and from all points on the road operated by said company.

"Also, that it will at all times hereafter during the continuance of the Walker River Reservation for Indian purposes transport all government supplies destined for the Walker River Agency, to an extent not exceeding two thousand (2,000) pounds in each year, over said road free of charge to the United States.

"Also, that it will promptly pay to the person or persons entitled thereto all losses and damages which they, the said Indians, individually or in their tribal capacity, or any other Indians lawfully occupying said reservation, may sustain by reason of the killing or maiming of their stock by the trains of said railroad company, through fires

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47TH CONGRESS, 2d Session. | SENATE. | Ex. Doc. No. 6.

LETTER

FROM THE

SECRETARY OF THE INTERIOR,

TRANSMITTING,

In compliance with section 445 of the Revised Statutes, a statement showing the number of public documents received by this department during the fiscal year 1882, *and the disposition made of them.*

DECEMBER 8, 1882.—Ordered to lie on the table and be printed.

DEPARTMENT OF THE INTERIOR,
Washington, December 4, 1882.

SIR: I have the honor to submit herewith, in compliance with the requirements of section 445 of the Revised Statutes, a statement showing the number of public documents received by this department during the fiscal year ending June 30, 1882, and the disposition made of them.

The report referred to above accompanies a similar communication this day transmitted to the Speaker of the House of Representatives.

I have the honor to be, very respectfully, your obedient servant,

H. M. TELLER,
Secretary.

Hon. DAVID DAVIS,
President pro tempore United States Senate.

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47TH CONGRESS, 2d Session. | SENATE. | EX. DOC. No. 8.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

In response to Senate resolution of August 5, 1882, information relating to the basis upon which the government settled with certain railroad companies in Tennessee for the claim of the government rolling-stock and material purchased from the United States in 1865.

DECEMBER 8, 1882.—Ordered to lie on the table and be printed.

WAR DEPARTMENT,
Washington City, August 8, 1882.

SIR: I have the honor to transmit herewith the information called for by Senate resolution of the 5th instant, which resolution provides—

That the Secretary of War be, and hereby is, directed to report to the Senate such information as the records of that department contain as to the basis upon which the government settled with certain railroad companies in Tennessee for the claim of the government rolling-stock and material purchased from the United States by said railroad companies in or about the year 1865, with copies of the correspondence specified in the paper hereto attached, on the subject of said settlement.

The paper accompanying the resolution is herewith returned.

Very respectfully, your obedient servant,

JOHN TWEEDALE, *Chief Clerk,*
For the Secretary of War in his absence.

The PRESIDENT *pro tempore*
United States Senate.

LIST OF PAPERS.

Copy of communication of Hon. W. W. Belknap, Secretary of War, to R. T. Wilson, president of the East Tennessee, Virginia and Georgia Railroad, dated July 31, 1871.

Copy of letter of R. T. Wilson, president of the East Tennessee, Virginia and Georgia Railroad, to Hon. W. W. Belknap, Secretary of War, June 10, 1872.

Copy of communication of Edward H. East to W. G. Brownlow, governor, &c., not dated.

Communication of R. T. Wilson, president, &c., to Hon. W. W. Belknap, Secretary of War, dated November 14, 1871.

Letter of W. G. Brownlow, United States Senator, to Hon. Simon Cameron, United States Senator, dated January 15, 1872, and the letter of Hon. Simon Cameron, in response, dated January 16, 1872.

Communication of Hon. Horace Maynard to Hon. W. W. Belknap, Secretary of War, and Amos T. Akerman, Attorney-General, dated September 18, 1871.

Letter of Hon. Benjamin F. Butler to Hon. Horace Maynard, January 17, 1872.

Letter of Hon. John A. Bingham to Hon. Horace Maynard. Not dated.

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Letter of Hon. George Andrews, district attorney East Tennessee, to the Secretary of War, of February 6, 1872.

Letter of Hon. Stanley Matthews, Arnon Perry, and George Andrews to the Secretary of War, April 27, 1872, and the letter of the Secretary of War of May 15, 1872.

Letter of George Andrews to E. C. Camp, United States district attorney, September 20, 1871.

Letter of O. P. Temple to the Secretary of War, September 19, 1871.

EAST TENNESSEE, VIRGINIA AND GEORGIA RAILROAD,
New York, January 10, 1872.

Hon. W. W. BELKNAP,
Secretary of War:

SIR: Since my letter to the department, of November 14, 1871, I have had the honor of examining the letter to the Secretary, of the Quartermaster-General, Brevt. Major-General M. C. Meigs, in opposition to the suggestions of my letter asking a settlement under the act of Congress of March 3, 1871, of the suits of the United States against the railroads of which I am president. The high character of General Meigs as Quartermaster-General, his intense devotion to the interests of his department and hostility to all questionable claims against it, and the severity of his criticisms in his lengthy communication upon the claims asserted by me, make it necessary that I should reply thereto as clearly and fully as possible.

The officers of the companies which I represent were not prepared for the harshness of the language used by the Quartermaster-General, nor for his earnestness in opposition to their claims as now presented, and we most sincerely regret that he felt called upon by his present sense of public duty to deal, as we conceive, so unjustly with meritorious claims, presented for consideration and for recognition in whole or part in an unobjectionable form.

General Meigs says of the claims of the companies, that "they have no real merit and are entitled to no consideration whatever"; reiterates of a particular claim that "it amounts to nothing and is entitled to no weight whatever"; and proceeds to oppose in detail every claim, legal or equitable, set up in behalf of the companies, and to declare that to permit any of them to have weight in compromising the suits of the United States against the companies "would be subversive of the public interests, contrary to public policy and to the intention of Congress, establishing a dangerous precedent, and finally rewarding traitors for their treason."

We are quite sure that the Quartermaster-General, when using this language, overlooked his own previous declaration on the same subject.

What is now proposed is not the payment of claims from the Treasury, but the reduction of the amount of bonds executed, under compulsion, by an officer of the company, and now in doubtful litigation, in accordance with an express act of Congress authorizing the Secretary of War to compromise, adjust, and settle such litigation upon such terms as to amount and time of payment as may be just and equitable. The Quartermaster-General says that the claims of the companies urged as equitable and proper to be considered in such compromise are entitled to no consideration.

But February 18, 1867, the Quartermaster-General, speaking of the same bonds and of the same equities claimed in reduction of them, said:

"I thought it likely that if they made application to Congress they would be treated liberally, and might even be eventually released from their bonds. I did not expect we would get much money from them, as I suppose that Congress in its discretion, in order to aid in re-establishing trade and prosperity, might think it fit to relieve them from these claims.

"Question. Was any intimation given to these companies that such would be the case?

"Answer. I might have expressed the opinion in discussing the case with them that Congress would possibly or probably do so, but the executive branch of the government could not. That was my impression at the time, and I always talked frankly with them. I wished to know their sentiments, and had no desire to conceal my own views or opinions."—(Testimony before Committee on Southern Railroads, page 266.)

By an act of Congress of January 31, 1862, the President was authorized to take military possession of any and all railroad lines in the United States.

Section 3 is as follows: "*And be it further enacted*, That three commissioners shall be appointed by the President of the United States, by and with the advice and consent of the Senate, to assess and determine the damage suffered, or the compensation to which any railroad or telegraph company may be entitled, by reason of the railroad or telegraph lines being seized and used under the authority conferred by this act, and their award shall be submitted to Congress for their action."

The government counsel in the pending lawsuits assert that our companies were

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not taken possession of under that act, but by military capture. But the Quartermaster-General always took the contrary view, and claimed that the taking of the roads was under the act of January 31, 1862.

In his testimony before the Committee on Southern Railroads (page 260) he says:

"In talking with the managers of the roads, I had always in mind the law of January 31, 1862."

These full and explicit declarations of the Quartermaster-General show that at a time when his statements and actions influenced potentially the companies he committed himself to the propositions—

1. That the roads were taken possession of under the act of January 31, 1862, by which the companies were to be paid for the damages suffered or compensation for for their use.

2. That when the bonds for rolling-stock were signed, he did not expect to get much money from them, but thought that Congress would treat the roads liberally and release the claims; and so expressed himself to the officers of the roads. [As a matter of fact, upon purchase of about $600,000, where he did not "expect to get much money," the companies have already paid about $328,000 at arbitrary rates.]

3. That this release would be good public policy, in order to aid in re-establishing trade and prosperity. ["I could see good policy in treating them liberally. If we pardon prominent rebels and release their estates from confiscation, I cannot see how we can justly deal severely with railroads."—Testimony, page 266.]

But now, when relying upon the assurances and following the advice of the Quartermaster-General, the companies have applied to Congress, which, after full consideration and the favorable reports of the committees in the House and Senate, has authorized the Secretary of War to compromise and settle upon equitable terms, the Quartermaster-General says that to give our claims any weight would be contrary to public policy and the intention of Congress, and would reward traitors for their treason. We must believe that these last declarations were inconsiderately made by General Meigs, who, while rigid in his regard for the public interests, means to be just, and has always heretofore endeavored to be consistent. We trust we may yet have an impartial, equitable, and favorable hearing, even in his department.

This earlier and better opinion of General Meigs, that the Tennessee Railroad, including these companies, should be liberally treated, is also abundantly supported by—

1. President Lincoln.
2. Major-General Thomas.
3. Major-General Burnside.
4. The committees of both houses of Congress, all of whom, as appears by my letter of July 31, 1871, have expressed their judgment that whenever a tribunal could be constituted with authority to deal equitably with all the claims and counter-claims, there should be a fair, just, and liberal treatment of the companies, if necessary, even to some allowance by the United States for the use of the roads during the war.

What are the equities of the companies?—Assuming, then, on the strength of the assurances of General Meigs, and others whose representations and opinions are legally and morally binding on the United States, that the railroad companies, consistently with public policy and the intentions of Congress, may possibly have equities which are of real merit and entitled to weight and consideration in the equitable settlements which the Secretary of War is to make, under the act of March 3, 1871, we propose to recite the facts out of which these equities spring, and, while doing so, to answer to the objections of the Quartermaster-General.

Before doing this, however, there are two points which we request may be distinctly borne in mind.

1. The equities set up by the roads are not, in the present proceedings, under the act of Congress, urged for the purpose of procuring any payment from the Treasury, and if wholly or partially recognized in fixing the sum at which the pending litigation is to be compromised, could in no just sense be treated as paid or allowed by the United States, so as to constitute any precedent for the allowance and payment of similar claims. On the contrary, they are urged only as equitable considerations, which the committees of Congress and Congress itself have said may be considered in fixing the amount which shall be paid the United States by the companies in settlement of a claim of the government in suit against those companies, which is at least of doubtful validity, and vigorously resisted by the defendants.

2. It is unnecessary, in order that the Secretary of War may make a settlement which for the sake of closing controversy the companies will deem satisfactory, to credit to the companies one single dollar on any claim for damages to or for the use of the roads, or any claim in the remotest degree forbidden by public policy. Those claims have been stated and argued because they made a part of the whole case of the companies in the lawsuits, and are fairly entitled to consideration under the act of Congress. But rejecting them all, the Secretary of War can accept the amount offered in our letter of July 31, 1871, and still offered, and yet collect into the Treasury more money than the United States are justly entitled to. If these claims should

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not only be considered, but should also be allowed to the full extent which the companies deem morally just, the roads would have to pay no money to the government, but would be entitled to receive large sums from the Treasury. Unfortunately, however, they have long since given up any hopes that the government will voluntarily do them this full justice, and they will be content, for the sake of settlement, to waive the most objectionable, though just, claims, and to pay instead of receiving money. This act of Congress, and the attempts in pursuance thereof to settle the lawsuits, are proceedings to enable the Secretary not to take money out but to place money in the Treasury, which, if the litigation continues, will not for a long time and may never be realized.

INVALIDITY OF THE BONDS IN USE.

Proceeding, then, to the fact, it should be first noticed that the suits of the United States against the companies are upon certain bonds of a remarkable character, signed by the presidents of the companies without the consent of their board of directors, which bonds the companies aver were null and void. If their claim on this point prevails, it is difficult to say what remedy the United States have against the companies. Defeated in the pending litigation, suits must be commenced anew, and long delay will ensue. Surely, if there is any considerable probability that the bonds will be held void, the department, instructed by the act of Congress, should not hesitate to compromise the cases, if this can be done so as to bring a large sum into the Treasury.

But General Meigs says the companies' objection on this head "amounts to nothing and is entitled to no weight whatever." Is he correct?

The order of Secretary Stanton, of August 8, 1865, surrendering the Tennessee railroads to their owners, and allowing them to take rolling-stock at a fair valuation, provided that the companies should give "bonds satisfactory to the government" to pay for the same. This order prescribed no extraordinary nor objectionable provisions to be inserted in the bonds.

All or nearly all the rolling-stock and personal property purchased by our companies for the government was received under this order of August 8. The companies took possession of their roads about August 28, 1865.

Under the order of August 8, the companies expected to give bonds in ordinary form, and had reason to believe that in such bonds, or in connection with their execution, some arrangement would be made for auditing and settling their claims for property delivered to General Burnside, which they had long before that time urged upon the government, by repeated letters of Mr. Brauner to General Thomas and President Johnson.

But on the 23d of October, 1865, nearly two months after the companies had been in possession of their roads and of the rolling-stock and personal property, Quartermaster-General Meigs promulgated an order of Secretary Stanton, of October 14, 1865, prescribing the form of bond which would be considered satisfactory by the government.

The bonds thus required, among other unusual provisions, contained the following:

1. In default of punctual payment of the monthly installments, the United States were to be authorized to take possession of and sell the rolling-stock and personal property which had been purchased.

2. The United States were also to be entitled to take possession of the railroads themselves, and to collect all their revenues.

The execution of bonds in this form, with these extraordinary clauses, was correctly and justly objected to by both Mr. Brauner and Mr. Callaway. The penal amount of the bonds was $500,000 in one case, and $711,000 in the other; and the execution of these bonds by the presidents without the consent of their directors would have been an attempt on their part to create a mortgage or lien upon the road-bed, real estate, and franchises of the roads, which they could not, by any law, possibly do; they therefore requested time to consult with their directors, but this was refused them, and then came the following most remarkable attempts to create a contract binding upon the companies:

[Telegram.]

NASHVILLE, *December* 8, 1865.

J. R. BRAUNER, *President:*

If Mr. Hoxsie will be here on Wednesday a. m., it will be satisfactory, provided he has full authority to settle and close all matters connected with your road. The bond must be executed at once; a few thousand dollars either way on it can make no difference.

F. J. CRILLY,
Brt. Maj., A. Q. M.

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NASHVILLE, TENNESSEE, *December* 8, 1865.

THOMAS H. CALLAWAY,
President E. T. and Georgia R. R., Knoxville:

If Mr. Talmage will be here on Wednesday morning with full authority to settle and close up all papers, it will be satisfactory. I do not see that it is necessary for your board of directors to meet in order to execute the bond. The order of the bond is positive, anyhow, and no action of theirs can negative. The department is calling for the bond and I cannot give the delay asked for.

F. J. CRILLY,
Brevt. Maj. and A. Q. M.

Treating these military commands as imperative, and believing that if they were not obeyed the military authorities would resume possession, not only of the personal property, but of the railroads themselves, Messrs. Brauner and Callaway signed the bonds under protest.

Their protest stated:

1. That they signed because required to do so, and to avoid collision with the civil or military authorities.

2. That they could not legally execute, without the authority of their directors, who could not be convened within the time allowed by Major Crilly.

3. That in signing they did not waive, but expressly insisted upon, the just claims of the companies against the government, a settlement of which they contended contemplated in the order of August 8, 1865.

If, under these circumstances, the bonds signed are contracts binding upon the railroad companies, then all established legal principles are at an end; and all civil contracts had better be made, and all legal liabilities determined by military mandate. At all events we think our objections to the validity of the bonds should not be dismissed as "amounting to nothing at all, and entitled to no weight whatever."

Against the legal opinion of the Quartermaster-General, we venture to quote the Judiciary Committee of the House of Representatives, who say that "they are impressed with the consideration that there may be doubts about the validity of the bonds accepted by the roads in the manner that was done, and under the apparent form of compulsion used."

Overvaluation of the property purchased—The claim of the companies that, in compromising the lawsuits, the alleged overvaluation of the property purchased should be considered, is not objectionable on any grounds of public policy. This has been conceded in every stage of the negotiations. Messrs. Matthews and Perry, in their letter to the Secretary of September 16, 1871, says: "We have always advised that if in fact an overvaluation was made, it was a fact that ought to be taken into consideration in any amicable adjustment, and for which proper allowance should be made."

That the property was in fact valued at twice the market price of auction sales is not disputed.

Albert Fink, esq., one of the appraisers, says: "I do not hesitate to say that had the rolling-stock of the government been sold for cash in the ordinary way of auction sales, to the highest bidders, it would have brought one-half the valuation put upon it by the commission." (See letter of July 31, 1871.) Colonel Crilly swears that the portion of the property which was sold at auction sold very low.

"Q. Lower than the valuation?

"A. Yes, much lower; in some cases at half."

He also says, referring to the sales to the railroad companies: "I think we realized probably three million dollars more by selling it in that way than we would by selling it in any other shape." The engines which were sold there for $17,000 would not have brought $10,000.

The Quartermaster-General, however, argues that there was no overvaluation, because, he says, three-fourths of all the government property was sold to the various companies on credit, realizing about $7,400,000, while the balance, sold at auction, realized about $3,500,000. There must be some mistake in these figures; if they prove anything, they prove too much. If one-fourth the property brought $3,500,000 at auction, the other three-fourths should have brought $10,500,000 instead of $7,400,000 unless the auction prices were more than the prices paid by the railroad companies. But it is admitted that the latter were the highest. The mistake is undoubtedly in stating the proportion as three-fourths to one fourth, and all the conclusions from this mistaken supposition of course fall to the ground.

The Quartermaster-General also overlooks the fact that of this sum of $3,500,000 about $2,200,000 was received from sales in Virginia and North Carolina, almost all near Washington, where competition was active; prices raised higher than at the West and the property was in better condition. The locomotives of which he speaks as selling for from $15,000 to $17,000 each at auction in Virginia and North Carolina were probably new.

By a report of the Secretary of War of July 26, 1866 (Thirty-ninth Congress, 1st ses-

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sion, House Ex. Doc. No. 155, p. 445), it appears that 10 locomotives, costing $671,550.66, for $310,610 or nearly 45 per cent. of their cost.

But the Tennessee sales to the railroads, under appraisement, included 154 locomotives which cost the government $2,932,945.60 and were sold for $2,412,656, or at 83 per cent. of their cost. The prices realized in auction sales at the East average, for box cars, $561 each, and for flat cars $509 each, while the prices charged our companies in Tennessee, under the appraisement, averaged $845 for box cars, and $658 for flat cars; and the rolling-stock sold at Nashville was inferior to and had seen harder service than that sold at the East.

In answer to the case of the companies on this point of overvaluation, as fully stated in our letter of July 31, General Meigs argues that as the sales were on credit the companies ought to have paid more than the property would have brought at auction, which is, in a measure, a just suggestion; but our reply is that, in view of the actual value of the property, the prices subsequently obtained at auction, and all the circumstances of the purchase, too great a difference was made on that account, which the government ought most cheerfully to correct.

The companies have endeavored to state their claims on account of overvaluation fairly, and not to overstate them. The actual overvaluation, as compared with cash prices, being admitted, their claim that in an equitable compromise and settlement the actual value ought to be taken, they base upon the following considerations:

1. That the companies purchased largely of the overvalued property, in the belief that the government would reduce or cancel the bonds to be given therefor. The reason they had for so believing are stated in the testimony above given by the Quartermaster-General, Meigs.

2. They also implicitly believed at the time they made the *the* purchase that their counter-claims would be adjusted and allowed in some form, and, whatever the merits of these claims, this undoubted belief of the officers of the company cannot be overlooked in determining the amount which the government ought to exact as the value of the property. The justice and equity of the claims of the company on these points is emphatically stated by the House Judiciary Committee in commenting upon the testimony of the Quartermaster-General, Meigs:

"It may well be imagined that the company might have taken property, rolling and other stock, at a valuation much enhanced from the actual price, and that the appraisers might have been quite careless in the valuation affixed to the property, they being officers of the government, when their chief believed the property was never to be paid for, and the presidents of the roads, in signing the bonds, believed they would never be executed."

CLAIM OF THE COMPANY FOR PERSONAL PROPERTY VOLUNTARILY DELIVERED TO GENERAL BURNSIDE.

The Quartermaster-General says that "none of the property was voluntarily surrendered or turned over as alleged," and quotes Colonel Foster in support of his assertion.

It would be sufficient for us on this point to cite only the statements of General Burnside himself. In his letter of February 12, 1870, he says: "The disposition of the road toward us was in every respect favorable, and I have every reason to believe that it was their desire and intention to have thrown all the equipments into our hands, and it was only because the movement entirely beyond their control that the portion that was run off by the Confederate troops did not also come into our possession."

It is impossible to believe, if the facts were not as General Burnside says, that he would make his statements so emphatic, and that he would have favorably endorsed in writing as "correct and just" the claims of the company for the property delivered up to him.

But General Burnside's distinct statements are fully supported by the testimony of witnesses already taken.

Mr. E. A. Sawyers testifies that he was employed by President Brauner to go through the rebel lines and communicate with General Burnside, and make arrangements to prevent the rebels from carrying off the rolling stock on the approach of the United States forces, and to retain and deliver it to the United States troops; that the witness did this, and arrangements were made to have the bulk of the rolling stock at Knoxville, while bridges should be burned and *and* the railroad taken possession of by the Union forces on both sides of that city; that the bridges were burned, but the Union troops failed to reach the railroad until after they had been repaired and much of the rolling stock run off by the rebels (which were the circumstances beyond the control of the companies referred to by General Burnside in his letter); that the witness's services were recognized; that he was afterwards employed by General Burnside, and that he was paid by him $2,000 for his services for the Union cause.

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Mr. W. C. Kyle and Mr. W. W. Willis testify that the latter went from Knoxville, through the Union lines, to communicate to Andrew Johnson, then military governor of Tennessee, the intention of Mr. Brauner to make an arrangement upon the advance of the United States forces to retain all his rolling stock and road equipments and deliver it to the United States.

Mr. Charles A. Hodge, foreman in the shops of the East Tennessee and Virginia Company, testifies that at the time the Union forces came to Knoxville he, "by direction of Mr. Brauner," disabled the locomotives and, in disobedience of the rebel military orders, retained large portion of the machinery and some rolling stock at Knoxville. Mr. Robert H. Seay, foreman of the car-shops, testifies to his efforts, under the directions of Mr. Brauner, to retain property at Knoxville, in violation of the rebel orders, and his success in doing so.

Mr. J. B. Hoxie, then master mechanic, and afterwards appointed superintendent of the road by General Burnside, testifies at length to the efforts made by Mr. Brauner and himself to evade the rebel orders and to retain the property of the company at Knoxville.

Mr. J. C. Harvey, engineer, testifies at length that, by the orders of Mr. Brauner, he brought a locomotive and ten cars down the road, out from the Confederate lines and into Knoxville, in order to deliver the property to General Burnside.

The testimony of these witnesses, and many others, conclusively show that all the personal property of this company which came into the hands of General Burnside was voluntarily delivered by the officers of the road, when, if it had not been for their predetermined efforts so to deliver it, it would have been run off into the Confederacy. General Burnside's official recognition of this fact ought to be considered as sufficient without additional testimony. The Quartermaster-General, however, argues that to recognize in the slightest degree, even in reduction of the amount due from the companies to the United States, the value of the property thus delivered, would be establishing a dangerous precedent. To this, we reply (1) that there is no such claim undisposed of that can be brought before the department for action; (2) that is the only other similar case of the government has recognized and allowed the claim. That case is stated by the Quartermaster-General in his testimony before the Committee on Southern Railroads (page 260), as follows:

"Q. Do you know whether an allowance has been made to any of the roads turned over for damages or use?

"A. I think not, except to a railroad in East Tennessee, which showed that it had a promise from General Burnside that it should be paid for certain materials taken from the road; the officers of that road had come forward as loyal men, and in consideration for so doing, General Burnside gave them the promise.

"Q. Do you know the name of the road?

"A. The Rogersville Branch. I thought if it could be done without making a difficult precedent, they should be paid for some iron which had been taken and used on other lines, and for some rolling stock. I thought this line should not be treated as a captured road, but as one that had given itself up and came to the aid of the United States. The Secretary did approve of my report, and sent it back for a distinct recommendation. I then reported that I could not advise him to make such a precedent. The matter was afterwards brought before a board of officers who were appointed to examine claims, and that board recommended that a certain allowance to be made to this road. It was referred to me to carry out the conclusion of the board. The president of the road stated in my office he would waive all other claims if we would give him iron to replace the iron we had taken away. I then directed iron to be bought in New York and sent to him, and I presume it has been done.

"Q. Did we use that road during the war?

"A. I think we did not use, but we took its iron and made use of its property.

"Q. You treated them as persons who had furnished the government with supplies to that extent?

"A. Yes; voluntarily furnished them."

THE QUESTION OF LOYALTY.

The Quartermaster-General argues at great length against the loyalty of the companies and their officers. Many of his statements can be best replied to by calling attention to the letter of July 31, 1871, in which the companies state their only claim on the ground of loyalty; that the East Tennessee, where this road is located, was in the main a loyal section, and that to treat fairly a corporation in that section whose property suffered damage and destruction during the war would be consistent with public policy; that a majority of the stockholders and, in the main, the managers of the company, were loyal, although many Union men were compelled to dissemble their real sentiments and to pretend devotion to the Confederacy in order to save their road from injury by the rebel forces, and that under these circumstances the stockholders might expect equitable, if not liberal, treatment from the United States.

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This moderate and just statement of the case has not been impaired by the proofs submitted by the Quartermaster-General, and we only propose to notice and to explain a few points in the case made by him.

From the beginning of the war until General Burnside captured Knoxville, in September, 1863, the East Tennessee and Virginia Railroad was within the rebel lines. Of course it was controlled and used by the Confederates, under the written orders of the rebel military authorities. Any officer of the company, if known to be a Union man, would have been driven off or imprisoned. All Union men were obliged to dissemble their real sympathies. It cannot denied that Mr. Brauner at this time gave a nominal adhesion to the Confederate cause, and expressed his devotion to it in order to protect his road, and to keep it in operation and in the hands of its stockholders and officers instead of the Confederate Quartermaster Department. All that has ever been claimed in behalf of Mr. Brauner is that he was at heart a Union man. There is no doubt that he was suspected by the Confederate Government of being a Unionist, and on that ground and because of the charge of employing large numbers of Union in cutting wood along the line and otherwise to keep them out of the Confederate Army, that the railroad was taken from his control by the rebel government and kept for almost two months.

The memorial, alluded to by General Meigs, of the directors of the company to the Confederate Congress, dated July 27, 1864, was made by eight directors who resided on a portion of the railroad which remained within the Confederate lines after the capture of Knoxville, and who sought by this memorial to save for the benefit of their stockholders the rolling stock which was in Confederate hands. Of these eight directors, three were unquestioned Union men, and the eight were a minority of the whole board, which consisted of seventeen directors.

W. P. Brewer and I. S. Goforth, whose statements are quoted by General Meigs, also remained on that portion of the road within the rebel lines, and they acted on their own responsibility in their alleged efforts to save the property of the road, and their services were never recognized nor paid for by the company.

The only direct evidence that Mr. Brauner preferred to have the property of his company go within the rebel lines instead of being retained for the benefit of the Union armies, is that of Millwee, Homer, and Ross. The statements of these men have been so often and so persistently quoted against our companies that it is expedient for us now effectually to dispose of them.

About October, 1867, when the company was urging upon the Government its claims for property delivered to General Burnside, Major S. R. Hamill, with his customary energy (while in office) in pressing the demands of the United States, and in opposing the counter claims of the roads, attempted to sustain his representations by using enemies of Mr. Brauner. He found Hoss who had been superintendent of the road during the war, but who had been suspected by Mr. Hoxie, and was an enemy of his and Mr. Brauner's. There was also hunted up one Mellwee, a carpenter, who had been employed on the road, and Homer, a conductor of a constructing train, both of whom had been discharged for cause. These three men made affidavits that Messrs. Brauner, Hoxie, and Hodge were prosecuting false claims against the government, and that the property of which they claimed payment had not been voluntarily delivered. Upon these affidavits an indictment was found in the United States court of the eastern district of Tennessee against Messrs. Brauner, Hoxie, and Hodge, which was tried at Knoxville sometime in 1869. Hoss attempted to sustain his previous statements, but admitted his hostility to the defendants. Milwee and Homer utterly failed to prove anything, and testified that if they had made the statements contained in their affidavits they did not know what they were doing. The defendants proved the correctness of their accounts as rendered to the United States, and the jury acquitted them in five minutes after leaving their seats. The United States judge who tried the case, at the close of the evidence for the prosecution, offered to strike the case from the docket without further trial, but the defendants insisted upon its completion and upon a verdict. The company denounced the whole proceeding as baseless, and founded upon malicious testimony. For its groundlessness and malignity, they refer with confidence to the presiding judge.

The criticism of the Quartermaster-General upon the meeting of the directors of the company at Rogersville Junction, and the resolutions there passed, are also, we believe, unjust. Those resolutions as distinctly indicated a determination to retain the property of the company where it could be taken possession of by the Union troops as the directors dared to express themselves. The resolutions absolutely refuse the rolling stock off the road, as the rebel authorities had ordered. This meeting was held, and the directors remained nominally within the rebel lines, because the Union lines had not advanced beyond Knoxville. None of the directors living in Knoxville, they could not get within the Union lines except by abandoning their houses and the rolling stock of the road, which they wished to save, and breaking through the Confederate pickets at Strawberry Plains, between Rogersville Junction and Knoxville, which first point was then held by the rebels. Their only course was to remain in the vicinity

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ity of their homes, and refuse to remove the rolling stock off the road, and wait for the advance of the Federal lines. The Quartermaster-General asks: "Would loyal men have done so? Were loyal men in the habit of doing so?" Our reply is:" "Undoubtedly.

The statement of the Quartermaster-General as to the operation of the East Tennessee and Virginia Railroad, both before and after General Burnside captured Knoxville, is incorrect, and causes a false impression. The officers of the road were not enthusiastic in their support of the rebel cause. On the contrary, they gave it a reluctant support, only sufficient to keep their road in possession of the corporation and out of the hands of the rebel troops, and even then they did not escape suspicion on account of their sympathy for the Union cause. When General Burnside approached Knoxville, the officers of the company, including the president, did not move the rolling stock to the northern portion of the road to prevent its capture; on the contrary, all the property that was moved was taken by the rebels at the point of the bayonet, and the president and other officers of the company, as has been already proved, made every effort to retain the property where it could be delivered to the Union armies. As General Burnside emphatically says: "It was only because of movements entirely beyond their control that the portion was run off by the Confederates troops did not also come into our possession. On the approach of the Union armies, the president and officers did not flee from Knoxville into the rebel lines, taking the books and papers of the company, nor was the rolling stock captured *en route* to the rebel lines; on the contrary, the facts appear to be beyond dispute that President Braunner went to his own home, twenty-six miles from Knoxville, with the purpose and expectation of remaining with the Union forces, and that the rolling stock, as much of it as the officers could manage or dared to keep, was retained for the same purpose.

The only public avowal by John R. Brauner of his loyalty to the rebel cause was at the time when his road was temporarily taken from him because of his suspected sympathy for the Union cause, and for the alleged management of the road in its interest, and was made for the purpose of getting his road back again; while the weight of the testimony is that his real sympathies were on the side of the Union. This is admitted in the otherwise very hostile report of the Committee on Southern Railroads, page 21. Colonel Hamill's statements that Mr. Brauner, while within the Union lines, was in communication with parties within the lines of rebel forces without the knowledge of the United States officers, and that he was tied on the cowcatcher of an engine to secure trains conveying Union troops, are utterly destitute of foundation. Colonel Hamill did not pretend to have any proof for the assertion, and everybody so situated as to know the truth knows it to be false.

The Quartermaster-General finds an answer to the claim of the companies for the consideration, on account of their voluntary surrender of the property to General Burnside, in an analysis which he makes of the list of present stockholders in the company, showing that three of the largest stockholders lived at the South and aided the rebellion. A sufficient reply to this argument, if indeed it is an argument, may be found in the fact that not until after the close of the war did the individuals named own more than $30,000 in the road. Their purchases of stock have been nearly all made since 1866, and the company ought not to suffer for an alleged misdeeds, nor to be treated liberally on account of any merit of theirs, any more than the Pennsylvania railroad or any other railroad in the stock of which they may have had transactions should have its rights affected thereby. If the present ownership of the stock can materially influence the opinion of the Quartermaster-General, it can be satisfactorily shown him that several months ago the large stockholders to whom he refers, sold and transferred nearly all their shares, and that they are now held by parties truly loyal during the rebellion, and who rendered efficient service in its suppression.

LARGER ALLOWANCES FOR GOVERNMENT TRANSPORTATION.

The first objection of the Quartermaster-General to allowing the companies in compromise and settlement their local rates for transportation performed for the United States is, that the bonds signed by the companies provided that they should receive only the rates allowed "Northern railroads."

To this it may be replied—

That if the bonds are void, that provision has no force against the companies. There was no such requirement in the order of August 8, 1865, under which the companies resumed possession of their roads, and they had the right to local rates unless they voluntarily agree to receive less, which was not the case.

2. That whatever the legal rights of the companies may be, it is certainly competent for the Secretary of War in compromising a lawsuit to allow them full rates. In this view the precedents were cited of the Baltimore and Ohio Railroad and the Hannibal and St. Joseph Railroad; the Louisville, Lexington and Frankfort Railroad, the Kentucky Central Railroad, and the Louisville and Nashville Railroad, the last three in close proximity to the East Tennessee roads.

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That these companies received nearly their full rates is admitted by the Quartermaster-General, but he attempts to break the force of the precedents by saying that the favored roads had been loyal to the government, and had aided in suppressing the rebellion, bearing the burdens and hardships of the war, while the present companies had been disloyal.

These suggestions are inapplicable, because the present question refers, as to both classes of roads, to rates for transportation after the close of the war, when its burdens and hardships had ceased, leaving the favored roads in first-class condition, while the present companies, reorganized with directors all loyal men, as required by Secretary's Stanton's orders, and vouched for by General Thomas, found their roads in a dilapidated condition. Surely every reason for paying full rates after 1865, to roads in the border States which had already been receiving them during the war, ought to apply to these roads which had been worn out during the war in the service of the government.

We are also ignorant of the reasons why the Quartermaster-General affirms the loyalty of the Kentucky railroads, while stigmatizing in such unmeasured terms the East Tennessee railroads as disloyal. Considering the localities, we think the presumption would be the other way. The district in which the East Tennessee and Virginia Railroad is located furnished more men for the Union Army, in proportion to population, than any other district in the United States,

Without arguing, as might be done, their legal validity, the companies argue with full confidence that there would be great equity in the recognition by the Secretary of War, in settling these lawsuits, of the claims for increased transportation.

In the letter of the companies of November 14, 1871, in accounting for their inability to state accurately the difference which in settlement should be made, to give local rates instead of the arbitrary military rates, it was stated that the identity of the accounts rendered by the companies was destroyed when the settlements were made by the department, and that in many cases "credits were delayed for months and sometimes for years."

The Quartermaster-General tersely and forcibly says: "There is no truth in the statement." Knowing the sensitiveness of all the departments to any suggestions that they may by any possibility have neglected or delayed business, our remarks were carefully framed so as not to reflect upon the department, and no such reflection is now intended. As a matter of fact, however, the delays suggested actually took place, mainly before the commencement of the two years referred to by the Quartermaster-General, when the accounts came to be settled directly by the department at Washington instead of by the local officers. Since that time the accounts have been promptly settled, as stated by the Quartermaster-General, and no differences have arisen except as to the classification of freight.

The statement still stands, however, that such has been the course of business that the department can readily prepare a detailed statement of the result of the difference between arbitrary and local rates, while the companies cannot easily do so.

The companies did not complain, as the Quartermaster-General seems to suggest, that there was $30,384.25 uncredited to them by the department. In a statement in the letter of November 14, there was correctly estimated to be due for services from March 1, to November 1, 1871, $30,000, occurring subsequent to the official statement up to March, and that amount was included merely to bring the account down to November, and in no degree for the purposes of complaint.

The statement of the Quartermaster-General that the companies refused to pay for certain wood, ties, and timber, which they had received and used, is calculated to create an erroneous impression. The material was mainly refuse stuff which the companies did not wish at all, but were willing to take at a fair count of the good material; but they denied the correctness of the military count. The dispute was ended, as usual in such cases, by a military order peremptorily directing the stuff to be charged to the companies. Afterwards, however, the justice of the objections became so clear that the prices were reduced, but not the quantities, as to which no correction has ever been made.

The Quartermaster-General also endeavors to show the ability of the companies to pay their indebtedness to the United States. It is true that they are in an improved condition. Although at the close of the war the roads were out of repair, the rolling-stock much worn and of inferior quality, and the companies under heavy financial embarrassments, yet they have gradually made gains and have struggled up from a fear of bankruptcy until it seems reasonably certain that the road can be continued in the hands of the stockholders. But the roads have been saved from bankruptcy only by good management, and there have been several periods when the necessity of paying the amount of the government bonds in full, without deduction, would have broken them down. The improved financial condition of the companies is therefore no reason for refusing them a fair settlement with the government. When possession of the roads was taken by General Burnside they were in good order—in a high state of repair; when returned in 1865, they were depreciated at least $2,000,000, with but

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one substantial bridge on the whole line, nearly every depot destroyed, sidings removed, the road-bed needing heavy repairs, and the iron nearly worn out. To save the companies from threatened insolvency and to enable them to make the repairs necessary to run their roads with safety, the State of Tennessee was compelled to come to their relief with loans of $50,000; and all the net earnings since have been applied to repairs, and have been insufficient to bring the roads into their former state.

SUMMARY.

The companies regret that they have occupied so much space in a review of some of the points of the letter of the Quartermaster-General, but they could not omit to do so in justice to their case as stated in their previous letters. They are surprised and disappointed at the unkind language and the unfriendly spirit of the communication, as compared with General Meigs's former utterances and what they have been led to believe was his disposition toward these companies; and they have, therefore, felt compelled to restate their case at such length in this letter, which they desire may be carefully considered by the Secretary of War in connection with their former letters of July 31 and November 14, which they believe furnish conclusive reasons for accepting the amount offered by the companies in equitable compromise of the litigation which the act of March 3, 1871 was intended to terminate. The case of the East Tennessee and Virginia Railroad, from which that of the East Tennessee and Georgia Railroad does not materially differ, may be summed up as follows:

1. That its railroad, located in East Tennessee, the loyal section of the State, a large majority of the company's stockholders and officers being Union men, was taken possession of by General Burnside on the arrival of his army at Knoxville, in September, 1863, and was held by the government until August, 1865, and then returned to the company in a depreciated condition.

2. That at the time General Burnside took possession, the company, by pre-arrangements known to the Union generals, retained at Knoxville, in violation of the rebel military orders, a large quantity of rolling-stock and other personal property, and voluntarily delivered to General Burnside, who approved the company's accounts for the same as just and correct, and has always advised their favorable recognition by the government.

3. That at the time of the return of the road to the company under Secretary Stanton's order of August 8, 1865, the company purchased of the government a considerable quantity of rolling-stock and personal property, at prices fixed by government appraisers, expecting to give bonds therefor, which would in some form recognize the right of the company to have a settlement for its property delivered to General Burnside.

4. That after the company received its railroad and purchased the rolling-stock and other property of the government, a new military order was made requiring the company to give a bond not previously suggested, creating a lien not only upon the property purchased, but also upon the whole railroad, for the amount of the purchase-money, without recognizing any right of the company to have an adjustment on its counter claims.

5. That the bond was signed by the president of the company in accordance with a peremptory military order, without being allowed time to convene his board of directors, and under circumstances which, at the least, render extremely doubtful the right of the government to enforce the bonds.

6. That the property purchased by the company was worth much less than the military valuation, according to the statement of some of the appraisers, some of it being worth one-half its appraised value.

7. That it was purchased by the company at the prices fixed only because it believed that its counter-claims would be allowed in offset, and that at all events Congress would reduce or release the bonds; abundant assurances to this effect being given the company by officers competent to represent the United States, particularly by Quartermaster-General Meigs.

8. That suits have been brought against the company on the bond, which the company contest on account of the invalidity of the bond, while offering to pay the actual value of the property received upon being credited with what is just and equitable on its counter-claims.

9. That since the company resumed possession of its road it has become entitled to credit for considerable sums for mail transportation, and also for the transportation of government freight and passengers; but the department allows only arbitrary military rates, and refuses the higher rates allowed other railroads in the border States similarly situated.

10. That Congress, March 3, 1871, for the purpose of avoiding this litigation, passed an act authorizing the Secretary of War to compromise, adjust, and settle the lawsuit on such terms as he may deem just and equitable.

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11. That while allowing the companies all their claims, as approved by General Burnside as correct and just, would make a balance due from the United States to the companies; and while even rejecting all those claims, but allowing a reduction of the prices less than the evidence warrants, and allowing increased rates of transportation, would leave nothing due from the companies, yet the companies, for the sake of ending controversy, are willing to pay, by way of compromise, a considerable sum ($120,000) into the Treasury.

12. That liberal treatment of the companies and a settlement on even better terms than those offered by them would be more than justified by the recorded opinions of President Lincoln, Major-General Thomas, Quartermaster-General Meigs, Major-General Burnside, the Military Committee of the Senate, and by the Judiciary Committee of the House of Representatives, and by the spirit of the act of Congress authorizing a just and equitable settlement.

Very respectfully,

R. T. WILSON,
President.

A true copy.

J. G. CHANDLER,
Depy. Qrmr. Gen. U. S. Army, Q. M. G. O., July 24, '72.

EAST TENNESSEE, VIRGINIA AND GEORGIA RAILROAD,
New York, Nov. 14, 1871.

HON. W. W. BELKNAP,
Secretary of War:

SIR: Referring to my letter of July 31 last, requesting the settlement of the suits of the United States against the railroads which I represent, I desire now to call your attention to the inclosed letter of Hon. Horace Maynard, dated Sept. 18, 1871, and a letter dated September 19, 1871, of Hon. O. P. Temple, one of the chancellors of the State of Tennessee, who was, at the close of the war, appointed State director of the roads by Governor Brownlow; also a letter of Hon. George Andrews, late a supreme judge of Tennessee and recently appointed United States district attorney of the eastern district. I also desire you to examine a letter of Senator Brownlow, dated August 8, 1871, recently forwarded to the department, and a copy of which is herewith inclosed.

These letters are important statements of reasons that may well induce the United States to deal liberally with the companies in compromising the pending lawsuits in accordance with the act of Congress of March 3, 1871.

The offer of settlement made in my letter of July 31 was, in the belief of the companies, an adequate and liberal proposition, and I regret that it has not, as yet, been accepted by the government. The reasons for believing the offer to be all that the companies ought to make or the government to require are fully stated in that letter, and I desire to ask your careful examination of it before a final decision.

I have been favored with a copy of a letter of Messrs. Matthews and Perry, counsel for the United States, dated September 16, advising the department to reject my offer. With due submission to the counsel, I believe their conclusion to be erroneous, and trust that after further examination into the case by the department and the counsel my offer will be accepted.

The counsel state that the purchase by the companies of the property offered at the prices fixed was purely voluntary, and that therefore they cannot urge an overvaluation as a defense.

This suggestion is inaccurate, and a very incomplete statement of the real facts. As to some of the property, Capt. F. J. Crilly, A. Q. M., informed President Callaway, under date of November 3, 1865, that the instructions of the major-general commanding are that the companies *shall be charged* with the material left on the road by the United States military railroad authorities.

As to the balance of the property, while it is true that, at the time the purchases were actually made, no military coercion took place, yet it is also indisputable that at that time the officers of the companies had no more doubt than they had of their own existence that when they should settle for their purchases they would also have a settlement with the United States of the claims of the roads for property delivered to the United States and other credits, which, upon any fair adjustment, would equal the amount of the property purchased by the roads, although at excessive prices.

To their astonishment, however, a few weeks later there came from the military authorities a peremptory demand for the execution of bonds for the amount of the property, accompanied by threats of the resumption of possession by the United States, not only of the property sold but also of the railroads of the companies then lately

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surrendered to them. The bonds were thereupon executed, not voluntarily, but, as the companies have always contended, under a coercion which made them legally void. The companies protested against being required to execute the bonds, and expressly asserted their intention to insist upon their just and equitable offsets.

The suits now pending, which the companies are attempting to settle, are not brought to recover the price of property voluntarily purchased, but are brought to enforce these void bonds.

The counsel, however, concede that, equitably, if in fact an overvalution was made, it ought to be taken into consideration, and proper allowance made in an equitable adjustment under the act of Congress, but they conclude that too great a concession on that account is asked for by the companies.

Respectfully differing from this conclusion I urge the Department to examine the testimony as to the overvaluation referred to in my letter of July 31, being that of Albert Fink, Esq., and Walter McQueen, esq., members of the Appraising Board, and of Colonel Francis J. Crilly, A. Q M. in charge of the railroad material at Nashville, who sold all the property.

The first four classes of offsets claimed by the companies are disposed of by the counsel by the suggestion that in their opinion they furnished no ground at law or in equity upon which a court of justice could proceed in reduction of the claim of the government.

Differing also from the counsel on this point, and believing that in law and equity the courts of the United States could and would allow some if not all those classes of claims, I have respectfully to submit that under the act of Congress of March 3, 1871, the Secretary of War is not only authorized but fairly required to go further than any court could go in allowing equities in favor of the companies, and may make any settlement which equity and good conscience, a liberal disposition towards the companies, and a generous public policy may suggest.

The counsel for the government well know that the act of March 3 was drafted and proposed by the government and accepted by the companies with the expectation that the Secretary of War would proceed not as a court but as a public officer entrusted by express statute with the fullest discretion to consider fairly and with a liberal and friendly spirit all claims of the companies whether legal and equitable or arising from the peculiar relations of these companies to the United States. For the counsel, therefore, to advise the Secretary to reject my offer because not based upon grounds which a court of justice would consider is hardly in accordance with the spirit or letter of the act, nor with the understanding with which its passage was agreed upon.

On this point I wish to call the Secretary's attention to the reports of the committees of Congress, which recommended the passage of the act. The Senate committee, in addition to the quotations given in my former letter (41st Congress, 3d session, report 39), say:

"Many of the equities set up by the roads appear to be well founded."

"Such a settlement * * in view of the many equities to which the companies are fairly entitled, it is clearly the privilege and duty of the Secretary, if he deems it advisable, to make."

The House committee (41st Congress, 2d session, report 78) also say that they "cannot fail to believe that there may be equities in favor of the roads, or of stockholders therein, which are entitled to be considered."

The Secretary is also requested to bear in mind that the principal offset, heretofore insisted upon by the companies I represent, is the claim for property actually and voluntarily delivered by the companies to General Burnside upon his arrival in East Tennessee. No similar claim has ever been set up and established by any Southern railroad. This is established by General Burnside's certification of the account (and we believe by General Grant's indorsement), as stated in my letter of July 31, and on page 65 of the pamphlet marked "A," herewith enclosed. As to the action of the officers of the roads, looking to the delivery of their property to General Burnside, I particularly ask your attention to the testimony of W. C. Kyle, page 98; E. A. Sawyers, page 69; J. B. Hoxie, page 43; C. J. Harvey, page 19; C. H. Hodge, page 22; E. A. Sealy, page 38; and F. M. Wheeler, page 30 of the pamphlet enclosed and marked "B," testimony for defense. Whatever may be thought of the other offsets claimed I may be permitted to say that there cannot be a shadow of a doubt as to the authority of the Secretary to consider this claim, and to allow the whole or such portion of it as he may claim just and right.

The claim of the companies for larger allowances than those made for transportation of men, materials, and mails was not fully stated in my letter of July 31. I had hoped before this to be able to give in detail the exact figures, but I am unable to do so on account of the manner in which the transportation accounts have been kept by the Quartermaster's Department. The accounts of the companies for transportation were from time to time duly forwarded to the various Departments, accompanied by the transportation orders, bills of lading, and postal warrants. The Quartermaster's Department in their settlements have made such changes in the accounts as to destroy

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all identity with the accounts rendered by the roads. Often owing to irregularities in the sub-vouchers, such as the omission of proper receipts or certificates and informalities in the orders under which the services were performed, for which the roads were in no way responsible, credits were delayed for months and sometimes for years. Without access, therefore, to the department records it will be impossible for me to make a statement in detail for the difference between the amounts allowed the companies for transportation and the amounts which would be due at local rates or rates allowed many other roads during the same period. The original sub-vouchers are, however, on file in the Departments, and if the Secretary deems it advisible a statement can be made from them.

I find, however, that the credits to the companies for transportation other than mail service amount to over $100,000, $70,000 of which is safe to assume were credited at the low rates. By the enclosed affidavit of O. H. P. Rogan, the auditor of the accounts of the companies, it appears that the local rates would have averaged 150 per cent. more than the arbitrary prices allowed by the government, which would make an additional sum of $105,000 fairly due to the companies. Allow me to call your attention to the following statement of the account of the roads with the government, in a different form from the statement in my former letter.

The purchases of the roads from the government were:

East Tennessee and Georgia		$366,153 02
East Tennessee and Virginia		265,655 50
Total property purchased		631,838 52
Instead of one-half as indicated by Mr. Fink and Mr. McQueen deduct one-third for overvaluation		210,612 84
Leaving the valuation of property at date of purchase		421,225 68
To this add interest at the rate of 6 per cent. per annum, from date of purchase, say November 1, 1865, to November 1, 1871, six years		151,641 24
Total due November 1, 1871, including interest		572,866 92
The credits as allowed by the government up to March 1, 1871, were	$278,863 23	
For services from March 1, 1871, to November 1, 1871, estimated	30,000 00	
Estimated amount due for increased compensation for services	105,000 00	
Interest on these payments from an average date, say three and one half-years, at 6 per cent	86,911 27	
		500,774 50
Leaving balance due government November 1, 1871, on above basis		72,092 42

The foregoing statement if adopted for the purposes of settlement would show to be due about $60,000 less than my offer of July 31, excluding all the claims connected with the war to which the government makes so much objection, but on which the companies relied, when the purchases were made, with so much confidence, as offsets against the value of the property purchased. Under these circumstances I feel confident that the Department and its counsel will, upon a review of the whole case, including a consideration of the suggestions of this letter, conclude to accept substantially the offer made by me. The companies I represent would be willing, I doubt not, to vary somewhat their offer to meet any reasonable suggestions on the part of the Department, but I am firmly convinced that the settlement I propose will secure to the government more money than, according to the facts in the case and the spirit of the act of Congress, the United States ought to exact of the defendant companies.

Very respectfully, yours,

R. T. WILSON,
Pres't.

WAR DEPARTMENT,
November 25, 1871.

Respectfully referred to the Quartermaster-General in connection with other papers pertaining to the East Tennessee, Virginia and Georgia R. R., referred for report on the 6th inst.

By order of the Secretary of War.

W. M. DUNN,
Asst. Judge Adv. Gen

A true copy.

J. G. CHANDLER.
Dep'y. Qr. Mr. Gen. U. S. Army.

Q. M. G. O., *July* 24, 1882.

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OFFICE OF THE EAST TENNESSEE, VIRGINIA & GEORGIA RAILROAD,
No. 44 Broad Street, New York, July 31, 1871.

Hon. W. W. BELKNAP,
Secretary of War:

SIR: In behalf of the East Tennessee, Virginia and Georgia Railroad, I have to request that you will compromise, adjust, and settle, under the act of Congress of March 3d, 1871, the suits now pending in behalf of the United States against the East Tennessee and Virginia, and East Tennessee and Georgia Railroads.

These two railroads, forming one continuous line, have been united under the laws of Tennessee into one corporation—the East Tennessee, Virginia and Georgia Railroad—and the old corporations having become merged or extinguished, any settlement of the litigation must be in the name of the new company, of which I am the president, and which I am fully authorized to represent.

Before submitting a definite proposition, which I trust will meet your acceptance, I desire your consideration of certain facts and some suggestions in behalf of the corporation. The act of Congress authorizes a just and equitable compromise, and I therefore feel at liberty to call your attention, not only to legal considerations, but also to certain just and equitable reasons which may properly lead you to waive or abate from what you conceive to be, although disputed, the strict legal claims of the United States.

I. The principal defense of the company to the claim of the government upon the bonds in suit, is the overvaluation of the property purchased. It was part of a vast collection at Nashville of railroad material, which the close of the war left in the hands of the United States quartermasters, and which, upon the surrender of the railroads, which the United States had used, to their original owners, had to be immediately disposed of on the best terms that could be obtained. The testimony is conclusive that this material was much worn, needed heavy repairs, and could have been made to realize very little money to the United States. By energetic management on the part of the War Department, it was, however, transferred to various railroad companies at a nominal valuation placed upon it by a board appointed by the military authorities, which was in reality twice its actual cash value, either to the United States or to the purchasers.

Albert Fink, Esq. (now of Louisville), one of the board, in a letter dated Nov. 23d, 1868, says:

"While I consider the basis on which the valuations were made, correct at that time on the basis of the war prices, the valuation is certainly too high if the ordinary prices for rolling stock (the prices before and after the war) are taken into consideration, and I do not hesitate to say, that had the rolling stock of the government been sold for cash in the ordinary way of auction sales to the highest bidders, it would not have brought one-half the valuation put upon it by the commission."

Walter McQueen, Esq., now Superintendent of the Schenectady (N. Y.) Locomotive Works, another of the board, in a letter dated July 10th, 1871, says:

"After carefully considering Mr. Albert Fink's letter, dated Nov. 23d, 1868, I fully concur in nearly all his statements in regard to the appraisal of the government locomotives and cars."

Col. Francis J. Crilly, A. Q. M. in charge of the railroad material at Nashville, testified as follows before the Committee on Southern Railroads, pages 147, 151, and 152:

Q. You said after the companies had been supplied, the balance was sold. How was it sold?

A. It was sold at auction.

Q. Who became the purchaser?

A. Some of it was sold to persons living at Nashville, and in the surrounding country; not very much, because there was very little money there; some to persons from Louisville, Cincinnati, St. Louis, and other cities. Great publicity had been given to it in the Eastern papers.

Q. That was after you had supplied the other roads under the general order?

A. Yes, sir.

Q. How did the prices you obtained at auction compare with the valuation of the board?

A. We had an immense amount of new hardware which we sold at auction very well, because it was property that could be used by every person; but the railroad property proper, such as the cars remaining nohand, anything strictly railroad property, was sold very low.

Q. Lower than the valuation?

A. Yes, much lower; in some case at half.

Q. Is there anything else occurs to you in connection with these matters that you think the committee should know?

A. Nothing except that in connection with the sales I spoke of, I would wish to say a little more. There was such a large lot of property there that we were selling it for six weeks, day and night. We had an immense building, which had been a

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commissary storehouse, lit with gas, and it remained open for auction sales until ten or eleven o'clock every night. The number of articles sold was multitudinous.

Q. That was after you had sold to the companies all they wanted?

A. Yes, sir; the accumulation of property was so great that we had all this left after the companies had been supplied. We claimed that we realized every cent that could be realized.

Q. What, in your judgment, was the policy of the executive order of Aug. 8th, 1865—was it judicious on the part of the government, or otherwise?

A. I think, so far as the sale of the property, it was most judicious. I think we realized probably $3,000,000 more by selling it in that way than we could by selling it in any other shape; and, as I said in this report, if the companies are held up to their bonds, the government will be largely the gainer in every way. * * *

Q. Do you know any reason why these companies should not be held to their bonds?

A. I think it should be made the subject of careful examination. * * * The roads were undoubtedly in a very crippled condition, and had nothing except the road-bed when this property was turned over to them; and they had to make the money (in most cases) to pay the installments due for this property. * * * If the time is extended with such conditions as a sound discretion would warrant, the government will lose nothing by so doing, as the appraised prices obtained for the property were much higher than it could have obtained otherwise. For instance, the engines which were sold there for $17,000 would not have brought $10,000.

Q. Then you think it should be the policy of the government to be indulgent?

A. Yes, sir.

The foregoing evidence is irresistible, because it comes from the government side. The appraisers would naturally be unwilling, unless compelled by truth, to admit the excessive value put by them upon the property. The prices realized at the subsequent auction sales are still more conclusive than the opinions of the government appraisers. Notwithstanding extensive advertising, the presence of bidders from abroad, and lively competition, the prices did not reach more than from 33 to 50 per cent. of the appraisal, as will be apparent from the records of the sale now on file in the Quartermaster's Department.

It is of course contended by the government cousel, that if the prices were exorbitant, the railroad companies would not have made purchases, and that having done so, they ought not now to complain.

The conclusive answer to this argument is, that the defendant companies purchased largely, although they knew the prices were excessive, because they honestly believed they were creditors of the government in large sums for railroad material delivered to the government, and for use and damage of their roads, and that they would not, therefore, be obliged to pay for the property purchased except by offsetting its value against greater amounts due from the United States.

Without reference to the actual legality of these claims for property delivered, and for use and damage, there can be no possible doubt as to the belief of the agents of the road who purchased, and that this expectation influenced and decided them to buy largely the over-valued property.

This confident expectation of the purchasers cannot in equity be entirely disregarded by the government, even if the claims themselves are refused. The grounds of this expectation on the part of this company will be called to your attention in this letter.

It may also be urged by the government that the companies would not have executed the bonds now in suit if they had believed the prices excessive, and did not expect to pay them except by offsetting their counter-claims against the government.

But a ready answer to this argument is to be found in the well-known fact that the companies did not willingly execute their bonds.

Col. Crilly, December 7th, 1865, telegraphed Mr. Branner, president of one of the companies: "The bond must be executed at once," and December 8th he telegraphed Mr. Callaway, president of the other company: "I do not see that it is necessary for your board of directors to meet in order to execute the bond. The order for the bond is positive anyhow, and no action of theirs can negative. The department is calling for the bond, and I cannot give the delay asked for."

Thus imperatively required, with a wholesome respect for the military mandate, Messrs. Branner and Callaway executed bonds, each stating that he did it "to avoid any possible collision with the civil or military authorities," and not intending to waive the just claims of the company against the United States.

II. Believing that the government cannot equitably resist their assertion that the valuation of the property sold was excessive and should be reduced, the companies, in addition, claim with confidence that the counter claims or offsets relied upon by them are meritorious, just, and equitable.

These offsets may be divided into five classes of claims, viz:

1. For personal property of the company which actually came to and remained in

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the possession of the government under such circumstances as to make its value a legal and equitable indebtedness.

2. For use and occupation, or the value of the transportation which took place while the United States held the road.

3. For damages done the road while in possession of the government.

4. On account of interest on the bonds of the company, loaned by the State of Tennessee, accruing during its possession by the United States, and which the company was compelled by military order to pay; and sundry other equities.

5. For larger allowances than those made by the accounting officers for transportation of men, materials and mails, since the company has been restored to possession of its road, and before the resumption of the allowance of local rates.

In asking the Secretary of War to review the foregoing claims, for the purpose of determining what he may and what he may not take into consideration in making a settlement under the act of March 3d, 1871, the companies confidently contend that, notwithstanding the unwillingness of the United States, as a general rule, to recognize in any form claims for damage, and for use or occupation of any property while in military possession during the war, or even for personal property actually received and consumed, yet there are special reasons why part or all of such claims in this case should be equitably considered in compromise and settlement. Public policy does not forbid, but would rather commend, their consideration, and it would not constitute a precedent for other cases not specially examined and legislated upon by Congress. These special reasons are:

1. The loyalty of the people of East Tennessee where this road is located. Notwithstanding overwhelming rebel military domination and bloody persecution, against which the United States neglected to protect them, and failed even to furnish them with arms with which to protect themselves, a large majority of the people of East Tennessee maintained unfaltering allegiance to the Union. Their devotion, struggles, and sufferings are part of the history of the rebellion, and should be remembered to their honor. To treat fairly, if not liberally, a public corporation in that loyal section, whose property suffered damage and destruction during the war, is forbidden by no law, and would be consonant with the most enlightened public policy. On this point the attention of the Secretary is called to the argument of the Hon. Horace Maynard before the House Committee on the Judiciary, May 20, 1870.

2. The loyalty of a majority of the stockholders, and, in the main, of the management of the defendant companies. Although the condition of East Tennessee during the early part of the war was such that many Union men were compelled to dissemble their real sentiments, yet it may be confidently asserted that a decided majority of the stockholders in both companies were loyal to the government, and desired the roads to be placed and remain under the control of the United States. Any acts to the contrary of any stockholder or director were performed under the pressure of rebel military rule, and to save the road from injury by the Confederates. There can be no doubt that John R. Branner, president of the East Tennessee and Virginia Railroad, for a long time previous to the occupation of Knoxville by the Union Army, had planned and arranged the surrender to it of the railroad, and the delivery to it of as much as possible of the rolling stock and personal property.

Under these circumstances, the stockholders of the road, whose stock was rendered utterly worthless during the war, and is now of small value, have the right to ask and receive equitable if not liberal treatment from the United States.

3. The recognition of Major-General Burnside, General Grant, and other representatives of the United States, of the claims of the companies, and their assurances that the claims would be adjusted and allowed.

In pursuance of the plans of Mr. Branner, president of the East Tennessee and Virginia Railroad, as above stated, large quantities of railroad material were, when the rebels evacuated Knoxville, in September, 1863, retained there, in express violation of a rebel military order, and voluntarily and purposely delivered to General Burnside. This is abundantly proved by the testimony of W. C. Kyle, page 98, E. A. Sawyers, page 69, J. B. Hoxie, page 43, C. J. Harvey, page 19, C. A. Hodge, page 22, R. A. Seay, page 38, and F. M. Wheeler, page 30 of testimony of defendants.

The statement of General Burnside himself is distinct on this point. In his letter of February 12, 1870, he says:

"The fact is beyond dispute that the equipment that we had in our possession was of the most incalculable service to us in our movements, and that without it our work would have been greatly retarded, and in some instances we could not have moved at all. The disposition of the officers of the road toward us was in every respect favorable, and I have every reason to believe that it was their desire and intention to have thrown all the equipments on our hands, and it was only because of movements entirely beyond their control that the portion that was run off by the Confederate troops did not also come into our possession.

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"I hope that some satisfactory settlement may be made with the government without unnecessary delay.

"Very truly yours,

"A. E. BURNSIDE."

An account of the personal property of the East Tennessee and Virginia Railroad, which was delivered to General Burnside and never subsequently returned, having been duly prepared, amounting to $210,474.07, was favorably indorsed by General Burnside, and his indorsement, of which the company has never been able to obtain a copy, may be found in the War Department. It was also indorsed by General Grant, and the indorsement is believed to have been favorable, although the company has been refused a copy of it.

A similar account of the property of the East Tennessee and Georgia Railroad received and consumed by the government, amounting to $206,060.11, was also indorsed by General Burnside, February 7, 1868, as "correct and just."

Damage accounts were also prepared—one in favor of the East Tennessee and Virginia Railroad, amounting to $276,726, and one in favor of the East Tennessee and Georgia Railroad, amounting to $118,852.22—and their correctness was certified to by General Burnside.

Not only were these two companies encouraged to believe, by the approval of these specific accounts by General Burnside, and by the favorable assurances which were from time to time given when their consideration was urged, that they would eventually be allowed, but it seems to have been the policy of high officers of the government to encourage the idea that such claims would be recognized; at least to the extent of a reduction or cancellation of the bonds given by the companies for the property purchased by them.

General Meigs stated in his testimony before the Committee on Southern Railroads as follows:

"I thought it likely that if they made application to Congress they would be treated liberally, and might even be eventually released from their bonds. I did not expect we would get much money from them, as I supposed that Congress, in its discretion, in order to aid in re-establishing trade and prosperity, might think fit to relieve them from these claims."

By Mr. MERCUR:

Q. Was any intimation given to these companies that such would be the case?

A. I might possibly have expressed the opinion in discussing the case with them that Congress would possibly or probably do so, but the executive branch of the government could not. That was my impression at the time, and I always talked frankly with them. I wished to know their sentiments, and had no desire to conceal my own views or opinions.

Anson Nelson, one of the executive committee of the Nashville and Chattanooga Railroad, had an interview with Major-General Thomas before that railroad decided to execute its bond. General Thomas stated that if the bond was not given he must take immediate possession of the road.

Mr. Nelson proceeds to say:

"We stated that the government was in debt to the Nashville and Chattanooga Railroad Company, for transportation of troops and stores during the war, to a very considerable extent, and inquired if an offset could not be made. General Thomas said no, that could not be done, for our claim was in one department of the government, while the debt due by us, if we made the purchase, was in another department; or language to that effect.

"He stated further that the government would treat us kindly, and he said there was no reason for us to expect any particular trouble on the subject, though he could give us no advice as commander of the department, and only gave us his individual opinion.

"Upon leaving his room I lingered behind and thanked General Thomas for the interview and the information obtained, and repeated the fact, that it was a very important matter to the stockholders, and as the committee then stood, my vote was to decide the matter. He said: 'Mr. Nelson, were I the whole company, I think I would have no hesitancy in giving the bond.' The interview decided my course, and the board repaired to the directors' room, at the depot, and Mr. Burns and myself voted for executing the bond, which was subsequently ratified by the entire board of directors, except Mr. Alloway, who was against the measure from the beginning.

"The directors all thought that the government would pay the company for the use of the road during the war.

"My vote in the negative would have defeated the giving of the bond, and I voted in the affirmative under the belief and firm conviction that the government would allow the company compensation for the use of the road during the war, as a matter of justice to the stockholders, otherwise I never should have voted for the purchase or

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executed the bond." (See report of House Judiciary Committee, 2d session 41st Congress, No. 78.)

President Lincoln was also emphatic in his assurances to the Tennessee railroads that they should be compensated for the use of their roads by the Union forces, as appears by the following affidavit of Messrs. Burns and Alloway, of the Nashville and Chattanooga Railroad:

"The undersigned visited Washington City in September, 1864, in the interest of the Nashville and Chattanooga Railroad Company, for the purpose of procuring compensation from the government for the use of the company's road. We accordingly waited upon President Lincoln, who readily granted us an interview of some two hours' duration, in which time the whole question of the use of the road by the government was fully discussed. Toward the close of the interview the President sent for Quartermaster-General Meigs, who joined the conference.

"President Lincoln expressed himself fully and earnestly that the company ought in all fairness to be paid for the use of its road by the government, but said that Congress had not placed money in his hands to disburse, nor did he have power to order money to be paid by any department, and referred us to General Meigs, then present, to whom he (the President) reiterated in strong terms his opinion that the company ought to be paid for the use of its road.

"After we left the President, we were invited by General Meigs to his office, where the matter of compensation was again talked over.

"General Meigs remarked that he had no money in his hands that had been appropriated for that purpose, and that he thought it advisable for the company to apply directly to Congress for relief.

"The impression made on our minds by the interview with President Lincoln was, that the company would in time be fairly compensated by the government for the use of its road. In this connection we will state further that the undersigned Mr. Burns was then the president of the company, and that in the execution of the bond of the company, now in controversy, he was controlled by a firm conviction, from the opinion of Mr. Lincoln, and others in authority, that the company would receive proper and just credits for the use of its road by the government, and so represented the matter to his board of directors. The directors present concurring with him in this conviction ordered the bond given, still relying on the justice of the government toward the company in the matter of allowing proper and just credits for the use of their roads.

"The undersigned N. E. Alloway was a director in the company, and one of the executive committee.

"M. BURNS.
"N. E. ALLOWAY.

"Sworn to before me this first day of April, A. D. 1871.

"WILLIAM H. GALE,
"*Notary Public, N. Y. County.*"

The House Judiciary Committee, in the report above alluded to, referring to the testimony of General Meigs, say: "It may well be imagined that the company might have taken property, rolling and other stock, at a valuation much enhanced from the actual price, and that the appraisers might have been quite careless in the valuation affixed to the property, they being officers of the government, when their chief believed the property was never to be paid for, and the president of the road, in signing the bonds, believed they never would be exacted."

"Again, it is not to be denied that these roads may well have believed that they had claims to a large amount for losses during the war, which they might have supposed would have been set off against their bonds."

The Senate Military Committee (41st Congress, 3d session, report 349), in recommending the passage of the act of March 3, 1871, say:

"The roads also claim large offsets and allowances, which, with apparent reason, they aver they were encouraged, by Major-General Burnside, Major-General Thomas, and Quartermaster-General Meigs, to believe would be allowed."

It seems clear, therefore, to the companies that, acting under the act of Congress of March 3d, 1871, and making a just and equitable settlement, the Secretary of War, under the special circumstances of this case, would be justified in recognizing and allowing all the first three classes of claims set up by the companies. But this is not necessary to effect a settlement which would be satisfactory to them. A recognition only of the unobjectionable claims of the first class, for the personal property actually received and consumed by the United States, together with a fair deduction for overvaluation, would more than extinguish any claim of the government against these companies.

As to claims of class 4, the injustice is clearly apparent of directing, by military order (dated August 8th, 1865), as a condition of the surrender of the railroads to their lawful owners, that the roads should then pay the interest on their outstanding bonds, which had accrued during the twenty-one months while the government held

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possession of the roads and kept the stockholders out. With much reason might the government well assume the payment of a part of the whole of the interest thus paid under its compulsion. The amount paid by the East Tennessee and Virginia road was about $200,000, and by the East Tennessee and Georgia road about $190,000, nearly all of which was paid to the State of Tennessee on bonds loaned by the State. This interest would never have been paid to the State by the roads, had not the payment been compelled by executive order. The State of Tennessee owed the roads protection; failing to afford it, the State could never have collected of the companies interest accruing on its bonds while a United States military force kept possession of their road, and the companies derived no benefit or income therefrom.

As to the claims of class 5, the companies say, that from the surrender of the roads to them in August, 1865, until March, 1867, they were allowed only military rates for the transportation of government freight and passengers; while during the same period nearly all the other railroads in the border States were paid nearly their full local rates; particularly the Baltimore and Ohio Railroad, the Louisville and Nashville Railroad, the Kentucky Central Railroad, the Louisville, Lexington and Frankfort Railroad, the Hannibal and St. Joseph Railroad, the Pacific Railroad of Missouri, as will appear by the records of the Quartermaster's Department. The additional allowance to which the defendant companies would be entitled, at local rates for passengers and freight, and just mail compensation, would amount to about $100,000, and the government may, with the utmost propriety, consent to an allowance of this character.

Applying the foregoing suggestions to the approximate figures in the suits now pending, and it is difficult to see why the companies should pay any sum to the United States in settlement of the litigation.

EAST TENNESSEE AND VIRGINIA RAILROAD.

The original amount of property sold this company was	$265,655 65
The credits for transportation, at government rates, as appears by the government books, to March, 1871, were	132,775 84
Balance	132,879 81

(Interest is not reckoned on either side).

If the value of the property sold the company is reduced one-half, say $132,827.82, the government claim has been fully paid without claiming any offsets, nor any greater rates for transportation than those allowed by the government.

Or, take the original valuation of	$265,655 65
and reduce it one-third, say	88 551 88
Balance	177,103 77
Deduct credits as above	132,775 84
There would be due	44,327 93

which is much more than offset by unobjectionable equities on the defendants' side, even by the difference occasioned by the transportation rates from August, 1865, to March, 1867.

Or, without reducing the original valuation of	$265,665 65
Deduct the credits	132,775 84
Balance	132,879 81
The account of the road for property delivered to General Burnside, and consumed, as certified by him, excluding the use of rolling stock and all claims for damage or use of road, is	135,333 07

or more than the government claim.

EAST TENNESSEE AND GEORGIA RAILROAD.

The original claim was	$366,183 02
The credits, at government rates, as appears by government books, to March, 1871, were	146,087 39
Balance	220,095 63
If the value of the property sold the company is reduced one-half	183,091 51
There would be due the government only	37,004 12

if no offsets were claimed.

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Or, take the original valuation of	366,183 02
and reduce it one-third	122,061 00
Balance	244,122 02
Deduct credits as above	146,087 39
There would be due	98,034 63

which would be more than offset by claims of the defendants, to which the government ought not to object, and would be about extinguished by increased rates of trasportation above alluded to.

Or, without reducing the original valuation of	$366,183 02
Deduct the credits	146,087 39
Balance	220,095 63
The account of the road for property delivered to General Burnside, and consumed, as certified by him, which does not include any claim for damage or use of road, is	206,060 11

which nearly equals the government claim.

After the foregoing summary of the case between the United States and the defendant corporations, the latter might well ask the Secretary of War to compromise and settle the suits upon the execution of mutual releases by both parties, without the payment of any money by either. But as many of the facts are contested, and the officers of the government are not willing to settle without some payment by the companies, in order to avoid litigation, which is injurious to the roads, I make the following offer:

In the East Tennessee and Virginia case, to pay $50,000, and the costs and expenses of litigation, not to exceed $5,000.

In the East Tennessee and Georgia case, to pay $70,000, and the costs and expenses of litigation, not to excee l $5,000.

I desire, however, that the offer may be acted upon before the middle of September.

Very respectfully,

R. T. WILSON,
President.

WAR DEPARTMENT, *November* 6, 1871.

Respectfully referred to the Quartermaster-General.

This proposition has been rejected, but as further propositions may be expected the views of the Quartermaster-General are requested on the points within presented.

By order of the Secretary of War:

W. M. DUNN,
Asst. Judge Adv. Genl.

Report rec'd Dec. 13, 1871.

A true copy.

J. G. CHANDLER,
Depy. Qr. Mr. Genl., U. S. Army.

Q. MR. G. O., *July* 24, '82.

To his excellency W. G. BROWNLOW, *Governor, &c.:*

You were pleased to refer to me, as attorney, the communication of James J. Dana, major and quartermaster of the U. S. Army, requesting "that you will cause to be delivered to Mr. Van Dyne, the road (Memphis, Clarksville & Louisville), rolling stock, and other material and property thereto belonging, that he may enter upon the discharge of his duties without delay." This claim is based upon the following bond, forwarded from the Quartermaster-General's Office to Mr. Van Dyne, a copy of which he has furnished to me, as follows, to wit:"

Know all men by these presents, that the State of Tennessee, by the act of the legislature of the State, hereto attached and made part hereof by W. G. Brownlow, governor of the State, for and in behalf of said State of Tennessee, does hereby acknowledge itself firmly bound with the United States of America in the full and just sum of three hundred and thirty-seven thousand nine hundred and ninety-three dollars and seventy-two cents (337,993.72), with interest thereon at the rate of $7\frac{3}{10}$ per cent. per annum from November 30th, eighteen hundred and sixty-five, lawful money of the United States, for which payment well and truly be made to the disbursing quartermaster of the

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United States military railroad, at his office in Nashville, or to such other disbursing quartermaster as may be designated by the War Department, within two (2) years from the thirtieth (30) day of November, A. D. eighteen hundred and seventy-five, the said State of Tennessee, by its governor, hereby binds itself and its successors firmly by these presents, sealed with its great seal, attested by the signature of its governor, and affixed by the express authority of the legislature this first (1) day of June, in the year of our Lord one thousand eight hundred and sixty-six (1866).

The nature of the above obligation is such that, whereas the above bounden State of Tennessee has purchased and received from the War Department of the United States (for the use of the Memphis, Clarksville and Louisville Railroad) rolling stock, iron rails, cross-ties, chains, spikes, timbers, and other materials for repairing and operating said railroad, in quantities, at prices, and to an amount and value which shall be evidenced by the receipts given for the same by George T. Lewis, receiver on the part of the State of Tennessee, to the proper officers of the War Department, upon a credit of two (2) years from the thirtieth (30) day of November, A. D. eighteen hundred and sixty-five, payable in equal monthly installments, with interest at the rate of 7.30 per cent. per annum, within the said two years, either in cash to the *disbursing quartermaster* of the United States military railroads, at his office in Nashville, or to such other disbursing quartermaster as may be designated by the War Department for this purpose, or in transportation of the troops or military supplies of the United States under the orders of the proper military authorities, at the rates of fare and tolls allowed for such service to northern railroads; and

Whereas the said State of Tennessee desires, and by these presents intends, to secure to the United States the complete and punctual payment, as aforesaid, of the amount which may be due for the said materials received by it from the United States; and whereas no payments have been made up to date of these presents, although large sums are due, in accordance with the terms of purchase of the materials aforesaid:

Now, therefore, if the State of Tennessee shall well and truly pay to the United States of America, as aforesaid, either in cash or in transportation, as aforesaid within (30) thirty days from the date of these presents, all arrears of interest and installments due the United States upon the date hereof, to wit, the sum of ninety-six thousand eight hundred and one dollars and forty-four cents ($96,801.44), and shall thereafter pay in equal monthly installments, either in cash or in transportation, as aforesaid, to the United States, within two years from November thirtieth, A. D. eighteen hundred and sixty-five, then this obligation shall be void and of no effect.

But if the said State of Tennessee shall fail to pay to the United States all or any portion of what may be due to the United States, on account of the said materials received from the United States, within two years from November thirtieth (30), A. D. eighteen hundred and sixty-five, either in cash, as aforesaid, or in transportation, as aforesaid, or shall fail to pay any of the monthly installments aforesaid punctually when due, then this obligation shall remain in full force and effect to the extent that may be necessary to fully repay to the United States for the full amount which may be due on account of the said materials so received, as aforesaid, and all loss or damage which may have been incurred by the United States by reason of the failure of the State of Tennessee to pay the same what shall be due therefor, when the same shall be due—and as a further security for such payment and indemnity to the United States—the United States shall have a lien upon the property sold to said State of Tennessee, and in default of such complete and punctual payment of all moneys which may be due on account of the aforesaid purchase of materials, be fully authorized to take possession of and sell said property, and also to place in charge and control of the said Memphis, Clarksville and Louisville Railroad an agent of the said United States, who shall be fully empowered, and by these presents is fully empowered, in case of such default, as aforesaid, to collect all the revenues of the said railroad and apply the same to the payment to the United States of all the monies which shall be due at the times of such application of such revenues to the United States for any such materials which shall have been delivered by the United States to the said State of Tennessee for the use of said railroad, or by reason of any loss or injury to the United States resulting from such default in payment of the same. And the said State of Tennessee shall have no authority to sell or convey out of its possession, without the consent of the United States first in writing obtained, any of the property referred to in this agreement, but shall hold and retain the same to the exclusive use of said Memphis, Clarksville and Louisville Railroad in carrying on the business of transportation of persons and property over its line of road until the whole is fully paid for as aforesaid.

In witness whereof the great seal of the said State of Tennessee is affixed hereto by authority of its legislature, and attested by its governor.

WILLIAM G. BROWNLOW,
Governor State of Tennessee.

Witness:
A. J. FLETCHER,
Secretary of State.

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The validity and execution of this bond and mortgage is based upon the following act of the general assembly of the State of Tennessee, to wit:

AN ACT to incorporate the Tennessee and Pacific Railroad Company.

* * * * * * * *

SECTION 57. *Be it further enacted*, That the governor be and he is hereby authorize to execute a bond for the purchase of railroad machinery, cars, and all other materials purchased for the use and benefit of the Memphis, Clarksville and Louisville Railroad and the Edgefield and Kentucky R. R. from the U. S. military R. R. department, and at Nashville, to the United States.

* * * * * * *

SECTION 62. *Be it further enacted*, That this act shall take effect from and after its passage.

Passed May 24, 1866.

WM. HEISKILL,
Speaker of House of Representatives.

———,
Speaker of Senate.

I, Andrew J. Fletcher, secretary of state of the State of Tennessee, do certify that the foregoing is a copy of so much of an act of the general assembly of Tennessee, passed May 24, 1866, as related to the execution of the bond by the governor to the United States for Railroad material, the original of which is now on file in the clerk of the senate's office, not signed by the speaker of the senate, but is now the law.

In testimony whereof I have hereunto subscribed my official signature, and by order of the governor affixed the great seal of the state of Tennessee, at the department in the city of Nashville, this 5th day of June, A. D. 1866.

[SEAL OF STATE OF TENNESSEE.] A. J. FLETCHER.
Secretary of State.

A true copy.

J. J. DANA,
Maj. & Q. M., Bvt. Brig. Genl., U. S. Army.

QUARTERMASTER-GENERAL'S OFFICE,
Washington, D. C., Sep., 17th, '68.

I, M. C. Meigs, Quartermaster-General of the Army of the United States, do hereby certify that the annexed copy, paged one (1) to seven (7), inclusive, has been made by a complete and reliable copyist in this office from the original on file, and is believed to be an accurate copy of said pages.

In testimony whereof I have hereunto set my hand and caused the seal of the office to be affixed.

[SEAL Q. M. D.] M. C. MEIGS,
Quartermaster-General, Bvt. Maj. Genl., U. S. Army.

WAR DEPARTMENT, *Sept.* 18, 1868.

I, J. M. Schofield, Secretary of War, do hereby certify that at the time of signing the foregoing certificate M. C. Meigs was Quartermaster-General of the Army of the United States, and that the signature thereto purporting to be his is genuine.

In testimony whereof I have hereunto set my hand and caused the seal of the War Department to be affixed.

[SEAL OF W. D.] J. M. SCHOFIELD,
Secretary of War.

In order that the relative merits of this and other claims may be understood, it is necessary to set out the past and present relations of that road to the State of Tennessee, and other parties, and its present condition.

About the year 1852, the State of Tennessee undertook to aid the spirit then being manifested of developing the railroad interests of the State, and on the 11th day of Feb., 1852, the legislature of the State passed what was known as the "General internal improvement bill," which bill is in effect as follows, to wit: "That when it was made known to the governor that certain railroads named (this being one) had procured bona fide and good and solvent subscription of capital stock to an amount sufficient to grade, bridge, and prepare for iron rails the whole extent of the main trunk line proposed to be constructed by such company, and has graded, bridged, and fully prepared thirty miles of the road at either terminus for the iron, the governor is authorized to issue to the company coupon bonds of the State to an amount not exceeding ten thousand dollars a mile on such section, and one hundred thousand

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dollars for bridges across certain rivers and streams, and so on each additional section of ten miles. Such bonds shall not have more than forty nor less than thirty years to mature, shall be payable at some point in the United States to bed esignated by the president of the company, and bearing interest at the rate of 6 per cent., payable semi-annually.

SECT. —. "These bonds, when issued, constitute a lien upon the section of the road so prepared, including the road-bed, right of way, grading, bridges, and masonry, upon all the stock subscribed to said road, and upon the iron rails, chairs, spikes, and equipments when purchased, the State being vested with the lien without any conveyance as a security for the payment by such company of the interest on such bonds as it falls due, and of the principal of the bonds at maturity."

SECT. —. "And upon the completion of the entire road the State is invested with a lien without deed, for the purposes mentioned, on whole road, superstructure, equipments, and stock, and upon all the property owned by the company, as incident to or necessary for its business."

SECT. —. "Nor can such company, after the issuance of the bonds for the first section, create any lien, encumbrance, or mortgage on any part of the road, or any portion of their property, in conflict with or having priority of the State lien."

SECT. —. "It is the duty of such company, at least fifteen days before each installment of interest on the bonds issued to it becomes due, to deposit in the Bank of Tennessee, at Nashville, a sum of money sufficient to pay such interest, including exchange and necessary commission, or furnish satisfactory evidence to the comptroller that such interest has been paid or provided for."

SECT. —. Upon failure of the company to comply with the requirements of the preceding section, the comptroller shall report the fact to the governor, who shall forthwith appoint a suitable person, at the expense of the company, to take possession and control of the road, and all the property and effects of the company, manage the same, and receive the rents, issues, and profits."

SECT.—. "The receiver shall continue in possession and managethe road until a sufficient sum is realized, exclusive of the costs and expenses incident to the proceedings, to pay off the unpaid interest, after which he shall surrender the road to the company."

By subsequent sections of this law each company is required after five years (5) to provide for and deposit a sinking fund with which to redeem the principal when it falls due, and the State takes a lien to secure this in like manner as it secures the payment of the interest.

In accordance with this act of the general assembly, the Memphis, Clarksville and Louisville road has received of the governor bonds, the amount of $1,042,000, up to the year 1861, each bearing six per cent. interest, payable semi-annually, and the company was in arrears of interest Jan'y 1st, 1866, $312,600, which the State had to pay. I need not state more than say, that by this act the State has a statutory lien, prior to all other persons or corporations, to secure the debt and interest mentioned. The State is not the owner of the property upon the failure of the road to meet its interest or provide a sinking fund. The company is still owner of the property, and are alone competent to dispose of it, and this ownership is subordinate to the State lien. The State could not *sell* the property of the company of its own accord, and without more, by virtue of this statutory lien, neither could it mortgage the road or its property without the assent of the company. To either a mortgage or sale the company would be a necessary party. All that the State could do would be to waive its right of priority of settlement, and it would be perfectly competent for the State to allow the United States, or other corporation or person, to be substituted to its right to prior payment if no other rights intervened to prevent it.

On the 1st day of February, 1860, the legislature of Tennessee amended the charter of said railroad (see acts of 1859 and '60, page 210) so as to allow said railroad "to issue, from time to time, income bonds, pledging the receipts of said railroad, in amount not to exceed three hundred and fifty thousand dollars in the aggregate," said bonds to be made payable at a time and place in the discretion of the company, and to bear a rate of interest not exceeding 6 per cent. per annum, with interest coupons attached;" that "said bonds are hereby authorized to contain upon their face a pledge of the income of said company from their road, after paying liabilities due the State of Tennessee, charges for running and the necessary repairs of the road." Said act further provides that "said company, by the president, may mortgage to trustees to be named therein, for the benefit of the holders of said bonds, and provide for a succession of trustees in case of the death, removal, or refusal to act. It shall to all intents and purposes pass the property recited, and privileges and franchises, to the trustees for the use of the holders of bonds herein provided to be issued, and such other as it purports to secure, together with the earnings of said road, after the payment of the expenses of running and repairs." The act shall not be construed, be so construed to affect, nor shall any mortgage executed by its provisions impair or in any

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way affect, change, or weaken the lien of the State of Tennessee, created by the State of Tennessee, in conferring or accepting State aid by said company."

Said act further provides that the company "shall cause to set apart and held sacred as a sinking fund such per cent. of the earnings of said road, after paying charges of running, repair, and incidental expenses in the operation of said road, as will be equal to the payment of interest on said bonds, and be sufficient to redeem each class of bonds as they fall due. The setting apart of said fund shall, however, in no event have preference over the rights of the State, as given in former legislation in reference to the income of said road."

In pursuance of this power, said company, on the 6th day of March, 1860, executed the following mortgage, to wit:

Memphis, Clarksville and Louisville Railroad mortgage to J. Guthrie and D. U. Kennedy.

Know all men by these presents, that the Memphis, Clarksville and Louisville Railroad Company have bargained and sold, and do hereby transfer and convey to James Guthrie and D. U. Kennedy, the latter a citizhn of Clarksville, Montgomery County, Tennessee, the former a citizen of the city of Louisville, Kentucky, and to their heirs and assigns forever, for the consideration of one hundred dollars, to the said company paid by said Guthrie and Kennedy, all of their said railroad from the point where when the said railroad intersects the line of the State of Kentucky in Montgomery County, Tennessee, and *containing* from said beginning point through the said county of Montgomery and the county of Stewart to the Tennessee River, and thence to the terminus of said road in Henry County, Tennessee, as the same is now located, including the bridges and all the work of every description belonging to said railroad company, and also all their franchises and privileges in any way belonging to or appertaining to said railroad company (not including the capital stock, bonds, and debts due the said company), also the income of the road after deducting State liabilities and cost of running and necessary repairs.

But this conveyance is made for the following uses and purposes, and for none others whatever, viz: The legislature of the State of Tennessee passed an act on the first day of February, A. D. 1860, entitled an act to amend the charter of the Memphis, Clarksville and Louisville Railroad Company, and for other purposes, in and by which they authorized the said company to issue income bonds in an amount not exceeding three hundred and fifty thousand dollars in the aggregate, and to bear a rate of interest not exceeding six per cent. per annum, with interest coupons attached, and also to convey their said road and franchises and privileges and other property for the purpose of securing and making certain the payment of the said bonds and all of the interest coupons thereon as the same may fall due, and that the said railroad company having in pursuance of the authority of the said act of the legislature issued bonds to the amount of three hundred and fifty thousand dollars in the aggregate, each bond being for five hundred dollars, and payable in not more than ten years from date thereof, with coupons for the interest from the date of said bonds at six per cent. per annum, payable semi-annually, said bonds and coupons all payable at the Bank of America, in the city of New York, the bonds all signed by W. A. Quarles, president of said company, and countersigned by Charles G. Smith, the secretary of said company, and the coupons all signed by said secretary, and to which bonds the seal of the said company is attached, and the said bonds being numbered from one (1) to seven hundred (700) "inclusive." Now this conveyance is made by virtue of the authority conferred by said act, passed the 1st day of February, 1860, and to secure and make certain the payment of the said bonds and coupons for interest thereon as the same may fall due, in accordance with the provisions of the said act of the legislature. Now, if the said railroad company shall punctually meet and pay off all the liens and liabilities due the State of Tennessee, and all of the interest coupons on said bonds, and shall also pay off all of said bonds as they mature and fall due, then this obligation to be void. But if they should not pay off the liabilities to the State of Tennessee and discharge the coupons when they mature and the bonds when they mature, and each of the coupons and bonds by its terms as they become due, then the said trustees, James Guthrie and D. U. Kennedy, or either of them, or their survivors, or their successor or successors, shall take into immediate possession all of said line of said railroad and all the property belonging to or appertaining thereto, of every description, including fixtures, machinery, running stock, station houses, and implements of every kind, and owned by themselves; and any agents and servants they may employ or appoint, shall conduct and manage and shall receive all the profits of the same after discharging the necessary costs of running and necessary repairs as fully as the same can be done by virtue of the authority of the said act of the legislature, and out of the proceeds pay off the State liability as it matures, and all the coupons due and unpaid, and that may afterwards become due, and shall also, out of the same proceeds, set apart a sufficient per cent. to create a sinking fund, out of which to pay off the railroad bonds as they fall due; and in

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the event the profits of the railroad after paying the liabilities to the State of Tennessee and the necessary running expenses and repairs shall not be sufficient to pay off the said coupons and interest as the same may fall due, then the said trustees, or either of them, or their successor or successors, shall proceed, after advertisement in two newspapers in Clarksville and two newspapers published at Memphis and two newspapers published in the city of Louisville, Kentucky, for a period of three months, to sell all the entire railroad and franchises and privileges appertaining thereto, and all the property of every description belonging thereto, on such terms as may be required by a majority of the owners of said bonds, and after discharging out of the proceeds of the sale the liens of the State of Tennessee and the costs of the proceedings, pay off first all the interest and coupons due on said bonds, and then the bonds due in equal proportions; and the balance, if any, they shall pay to the said railroad company.

In testimony of all which the said Memphis, Clarksville and Louisville Railroad Company have caused this deed to be signed and sealed (with the proper corporate seal) by their president, W. A. Quarles, and the same to be countersigned by their secretary and agent, C. G. Smith.

Done at the office of said company in the city of Clarksville and State of Tennessee, the 6th day of March, 1860.

[MEMPHIS, CLARKSVILLE, LOUISVILLE SEAL.]

MEMPHIS, CLARKSVILLE & LOUISVILLE RAILROAD COMPANY,
By W. A. QUARLES, *President.*
CHAS. G. SMITH,
Secretary, Memphis, Clarksville & Louisville Railroad Company.

STATE OF TENNESSEE,
Montgomery County:

Personally appeared before Wm. Rogers, clerk of the county court of said county, W. A. Quarles and Chas. G. Smith, the two within-named bargainers, with whom I am personally acquainted, and who acknowledged that they executed the within deed for the purposes therein contained.

Witness my hand at the office this 6th day of March, 1860.

WM. ROGERS, *Clerk*

Received 10 o'clock p. m., 6th March, 1860.
Registered 7th March, 1860.

JOHN D. BRADLEY, *R. M. C.*

It is thus seen that here is a second mortgage, subordinate to the statutory lien of the State, made to secure the holders of the bonds issued under this act, usually denominated "second-mortgage bonds." The holders of these bonds are generally believed to be non-residents of the State. This lien is not so extensive as the general lien of the State, and covers only part of the property upon which the State's lien exists, but aims to get the earnings of the road, which, as the road has resulted, is of the first importance.

You have perceived that we have two mortgages hanging over the road in favor of different parties. Now, upon close of the war, the road, with many others of the State which had been under the control of the U. S. military, were returned to the respective companies entirely out of repair; the bridges were down, track injured and iron gone, rolling-stock unfit for use or entirely gone, and the company wholly unable to do anything in aid of it. Thereupon the legislature of Tennessee, on the 18th day of January, 1866, passed an act which recites in its preamble that whereas certain railroads named, this being of the number, "are all out of repair," the bridges and trestles on said roads have been destroyed, and the companies are unable to put them in running order, and the State has large interest in said roads, and it is to the interest of the State and the people of the State that said roads should remain under their control, and that they should be put in running order; therefore, the legislature appropriates to the road bonds to the sum of $400,000, and retained the same character of lien as is reserved in the before-recited act of 1852, to secure the payment of this sum. On the 24th of May, 1866, the legislature made a similar appropriation of $100,000, to be expended in building a bridge over Cumberland River, and also directed the Governor to issue bonds to take up the back interest due on the bonds first issued to said road, to which last purpose bonds to the amount of $40,000 were issued, thus making the sum of appropriations made by the State to the road since the close of the war, $540,000.

This road, in consequence of its inability to meet the interest due upon its bonds, has been for several years in the hands of the State's receiver, but without paying the State anything, and even failing to meet its running expenses and repairs, and were such a calamity to befall it now as the destruction of one of the large bridges, it would cease to be used unless the State would make sufficient appropriation to rebuild; any accident now occurring to that road would find it without the means of repairing it.

The appointment of a State receiver, and the utter hopelessness of the company

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ver to meet its immense mortgage debts, besides its general debts, due all along its ine, many of which are now in judgment, induced the stockholders to petition to go nto bankruptcy; and on the 30th day of May, 1868, the railroad filed its petition in the ankrupt court for the middle district of Tennessee, sitting at Nashville, and the said etition will be heard at the October term, '68; and should the court make the adjudiation prayed for, it will order the road and all its assets into the hands of an assignee f the court, and of course will proceed to a sale. I cannot see that it will be to the nterest of the U. S. Government either to *forcibly* seize the road or even institute ther legal proceedings than these already pending in the bankrupt court. Why may ot the U. S. Government come into the bankrupt court as a creditor of the road, estabish its claim, and insist upon its priority, as provided in the bankrupt law? The State nd all other creditors will be compelled to this course for their debts. Why should here be any contest as to the receivership of the road, when in all probability all reeivers as such will be removed by the assignee of the bankrupt court in a short time, nd the rights and priorities of all parties adjudicated? The present State's receiver Cliff) has made a temporary lease of the road to another company, which owns the oad with which it is consolidated at either terminus, and by this arrangement the rdinary repairs of the road are kept up and its running expenses paid. This arrangeent is one of mutual interest to the creditors of the road, as well as to the company hat took the lease; the latter alone can run it without great expense until it is disosed by the bankrupt court, and this disposition looks to a settlement of all claims gainst the road.

It will be seen from the foregoing that the complication of said road may be abreviated as follows with reference to the time incurred:

1st. The lien of the State of Tennessee for original construction, $1,042, up to 1861.
2nd. The lien of the holders of the 2nd-mortgage bonds, $350,000.
3rd. The lien of the State of Tennessee for second advance, $54,000, since close of war.
4th. The claim of the U. S. Government, $391,938$\frac{64}{100}$.
5. The lease to Louisville and Nashville Railroad Company.
6th. The petition in bankruptcy.

Of course there cannot be any discussion of the question whether the U. S. Government will or ought forcibly to oust all others and take possession of the road and run t with a view to obtain a settlement of its debt; laying aside all question of legal ight to do so, and disregard of civil proceedings involved, it is not to its interest so o do. No receiver heretofore appointed has made anything out of the road, or even aid expenses. The government could not hope to do better. If, while it was in the ands of the government receiver, any of its bridges or trestles were destroyed, it would be put to the extraordinary expense of rebuilding, or the road would be useless nd the receiver an expense. In view of the large number of creditors already dissatisfied living along the entire line, I do not think it either wise or politic for the government to forcibly seize the road, thereby impair or destroy its value, as there can be no doubt that the present management of the road, outside of all repairs that have been recently made upon it, has increased its value as an article of sale more than $50,000 by putting it under way again, affording the public means of transportation, and keeping a patronage which was seeking other outlets. Certainly the government cannot object to testing its claim in connection with all the creditors of the road in a bankrupt court, the only tribunal competent to determine the amount of the respective claims, and the priority of each, in a legal and satisfactory manner, and the only tribunal that can pass any sort of title to a purchaser.

There can be no doubt that it is to the interest of all parties that the road should be sold and the proceeds applied according to law. The proceedings in bankruptcy look to this, and any other course adopted by the government looks to a defeat of this, and will present the spectacle of the military branch of the government defeating and depriving the judiciary of its rightful jurisdiction of a matter pending before it. I feel well assured that the officers of the government, to whom the matter was referred, and who made out the instructions of Mr. Van Dyne, did not have the entire relations, complications, and present conditions of the road before them, and that the law officers especially, and all others, will readily see that the only solution is the proceedings in court.

The United States have heretofore invariably asserted its pecuniary rights by legal remedies, enforced in her courts "by due course of law," and I know of no instance in which she has resorted to violence and force, to secure such pecuniary rights. It would be an example of lawlessness that a citizen would be punished for imitating, and deservedly so.

If the State of Tennessee and not the road is indebted to the amount of this bond to the United States, let the government look to the State; she will pay it. If she is not able to pay it at present, because all of her great interests have been crippled by a desolating war, let the government indulge her, or if not that, let the government, by lawful and peaceable means, enforce her bond in her courts, and not forcibly seize upon all the property of the railroad company, which is no party to the bond, to the detriment and ruin of the other creditors of the road.

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If your excellency accedes to the request of the Quartermaster-General, and puts the entire road, with all the property and franchises, into the hands of Mr. Van Dyne, the contract with the road that has leased it of the State receiver is violated, the proceedings in bankruptcy by which it is hoped the rights of all parties will be preserved and enforced will necessarily be stopped, and the second-mortgage creditors and all others now restless and anxious to have a conclusion of this matter will be postponed for an indefinite time, and until the United States receiver, taking the casualties and accidents that will necessarily occur, can make the net earnings of this road pay the debt and interest.

Your excellency well knows that before that could be done there would not be left a single vestige of the engines and rolling stock bought of the U. S. military department.

I am hopeful that when the officers of the government are made aware of the facts herein exhibited, that they will concede it to the interest of the government to assist in an early consummation of the legal proceedings now pending.

In respect,

EDWARD H. EAST.

A true copy.

J. G. CHANDLER.
Depy. Qr. Mr. Genl., U. S. Army.

Q. MR. G. O., *July* 24, '82.

EXECUTIVE DEPARTMENT,
Knoxville, Tenn., Oct. 1, 1868.

Col. J. B. VAN DYNE:

I have perused the legal opinion from E. H. East, esq., and herewith return it to you in order that you may transmit it to Washington. When the facts are all laid before the government, I feel confident that the government will attempt nothing further with the road.

I have the honor to be, &c.,

W. G. BROWNLOW,
Governor, &c.

A true copy.

J. G. CHANDLER,
Depy. Qr. Mr. Genl., U. S. Army.

Q. M. G. O., *July 24th*, '82.

MATTHEWS, RAMSEY & MATTHEWS,
LAW OFFICE, 58 WEST THIRD STREET,
Cincinnati, April 27, 1872.

Hon. W. W. BELKNAP,
Secretary of War:

SIR: The undersigned, attorneys of record for the United States in the cases pending in the circuit court of the U. S. for the eastern district of Tennessee against the East Tennessee and Virginia Railroad Company & others, and against the East Tennessee and Georgia Railroad Company & others, hereby concur in advising a compromise and settlement of the claims against said companies, now consolidated, under the act of Congress authorizing such settlements, upon the following terms, to wit:

The said consolidated companies to pay to the United States, in full and mutual settlement of all claims of each against the other, as they stand on the first day of January, A. D. 1872, as a sum agreed to be due as of that date, the amount of one hundred and ninety-five thousand dollars, five thousand dollars thereof to be paid in cash upon the consummation of the settlement, and ninety-five thousand dollars thereof to be paid on the first day of January, A. D. 1882, and ninety-five thousand dollars thereof to be paid on the first day of January, A. D. 1887, with interest on said deferred payments at the rate of four per cent. per annum, payable annually on the first day of January in each year, from January first, A. D. 1872, until paid, principal and interest payable in New York City, to be evidenced by two bonds of said company to the United States for said sums, with interest coupons annexed, and payment thereof secured by a mortgage to the United States, executed and delivered by said consolidated companies, upon all their property, assets, and income, and by the lien of a decree to be entered in said causes, to be enforced by execution and sale in case of default, according to the terms of a draft thereof, herewith submitted.

Respectfully,

STANLEY MATTHEWS.
AARON F. PERRY.
GEO. ANDREWS,
U. S. Dist. Attorney, Dist. of East Tennessee.

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WAR DEPARTMENT, *May 15th*, 1872.

The Attorney-General having concurred in the within advice as to the compromise and settlement of the within specified claims, the Secretary of War approves of the terms of compromise and settlement recommended, the said companies having accepted the same; and the attorneys of the United States in these cases are authorized and instructed to conclude the business by bonds, decree, and mortgage, as agreed upon.

This compromise is made under the provisions of an act entitled "An act to provide for the collection of debts due from Southern railroad corporations, and for other purposes."

Approved March 3, 1871.

WM. W. BELKNAP,
Secretary of War.

A true copy.

J. G, CHANDLER,
Depy. Qr. Mr. Genl., U. S. Army.

Q. M. G. O., *July* 24, '82.

KNOXVILLE, *Sept.* 20, 1871.

E. C. CAMP, Esq.,
U. S. Dist. Att'y:

SIR: My opinion has been requested as to the propriety or expediency of an acceptance by the U. S. of the proposition made by Mr. R. T. Wilson, pres't of the E. T., Va. & Ga. R. R. Co., to pay the sum of $130,000 in full of the claim of the U. S. against that Co. and including costs.

Not having been in this State at the time of the transactions out of which the claim arose, I have no personal knowledge of the facts, and I have not read the evidence taken in the case.

Under the circumstances I can only say that I think the Government of the U. S. should display a liberal policy and not a narrow or grasping one toward the road in question, and toward all the other roads in like situation.

If it be true, as is alleged by Mr. Wilson in his memorial, that the material and stock purchased by the E. Tenn. roads from the U. S. were estimated and charged greatly above their value, I certainly think that the U. S. Government, or its officers, if they have the power, should make a fair deduction and give the road the benefit of it in the settlement. I think also that the government, if it has not done so, should allow a fair and usual compensation for all the transportation furnished by the roads.

What are the facts in regard to these matters I cannot undertake to decide; but if the facts bearing upon the two points above indicated will justify a reduction of the claim of the U. S. to the amount, or nearly to the amount, offered by Mr. Wilson, I think the offer ought to be accepted.

Yours, respectfully,

GEO. ANDREWS.

A true copy.

J. G. CHANDLER,
Depy. Qr. Mr. Genl., U. S. Army.

Q. M. G. O., *July* 24, '82.

OFFICE OF THE UNITED STATES DISTRICT ATTORNEY
FOR THE EASTERN DISTRICT OF TENNESSEE,
Knoxville, Tenn., Feb. 6, 1872.

Hon. SECRETARY OF WAR:

SIR: I have received from Hon. Stanley Matthews, of Cincinnati, a letter in regard to the cases of U. S. *v.* the E. T. & Ga., and the E. T. & Va. Railroads. He encloses a copy of a letter sent to you by Messrs. Matthews & Perry, the special counsel employed in the cases, and who are, as I understand, mainly responsible for them, which letter recommends a compromise of the cases upon the payment of $175,000 by the railroads.

The statute authorizing compromise (16 Stat. at Lar., 473) requires that it be done upon the advice of the counsel of record, which I suppose would include the district attorney of this district.

I have been appointed and qualified as district att'y only since the first of January, ult., and as all of that time, except one week, has been occupied by the present terms of our Federal court, I have had no opportunity of becoming familiar with the facts and pleadings in these cases, never having had anything to do with them before.

I am not in the habit of recommending action in matters of which I know nothing, and it will be impossible for me to read and digest the mass of evidence in this case during the next two or three weeks of our present term of court.

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If, however, my refusing or delaying to sign the recommendation is in your view, & that of the counsel, preventing the government from consummating a desirable compromise, it would present the questions whether I might not sign *pro forma* upon the confidence which I have in the judgment of yourself and them.

There are persons in the community who freely charge fraud upon the railroad companies in getting up their counter-claims against the govt., and these suspicions may make the position of one here, who should rashly advise a compromise, an unpleasant one.

I write freely as to my situation in order that you may be able to give me such suggestions in the matter as you may deem desirable.

Very respectfully,

GEO. ANDREWS,
Dist. Atty. E. Tenn.

A true copy.

J. G. CHANDLER,
Depy. Qr. Mr. Genl., U. S. Army.

Q. M. G. O., *July* 24, '82.

KNOXVILLE, TENN., *Sept. 19th*, 1871.

GENTLEMEN: I have examined with some care the proposition for a settlement of the claims of the government against the East Tenn. & Va. and the East Tenn. & Ga. Railroad Companies, made by R. T. Wilson, president, July 31st, 1871.

On the reorganization of the East Tenn. & Ga. Railroad Company, in August, 1865, I was appointed a director in said company on the part of the State, and so remained for two or three years. My opportunities were, therefore, good for obtaining some knowledge of the demands of said companies against the United States. I also know the circumstances under which the bond to the government was executed by said E. Tenn. & Ga. R. R. Company.

It was well understood at the time that the price of the property sold to said companies was excessive. But what could they do? They had no money and no credit, and this was the only means of re-equipping the roads.

The company believed they had a just claim against the government, which would nearly extinguish the claim for property purchased. Acting on this conviction, they purchased said property; the said bond was executed under protest and under virtual duress.

On the ground of the excessive valuation of the property, I have no hesitation in saying that said railroad companies have a strong and a well-defined equitable claim against the United States.

Relying on the statements made in the communication of President Wilson, as to the rates of transportation allowed in favor of said roads, it seems that this, too, would constitute a strong equity in favor of said companies.

On the whole case, I do not hesitate to say that, in my opinion, the said companies are entitled to a large setoff against the claim of the government, and that the ends of justice will be promoted by allowing it in a fair and honorable compromise.

I have the honor to be, very respectfully, your ob't servant,

O. P. TEMPLE.

Hon. WILLIAM W. BELKNAP,
Secretary of War.
Hon. AMOS T. AKERMAN,
Attorney-General.

A true copy.

J. G. CHANDLER,
Depy. Qr. Mr. Genl., U. S. Army.

Q. M. G. O., *July* 24, 1882.

UNITED STATES SENATE CHAMBER,
Washington, January 15th, 1872.

MY DEAR SIR: I take the liberty of calling to your attention the enclosed letters of Mr. R. T. Wilson, president of the East Tennessee, Virginia and Georgia Railroad Company, making suggestions to the Secretary of War relative to a settlement of the litigation now going on between the United States and that company, growing out of the use of the railroad by the government during the war, and the sale to the company of rolling-stock and other property. I call your attention to the case because I think that as a matter of public concern you will be impressed with the expediency of liberal treatment of the railroad in a compromise to be made under an act of Congress, passed March 3, 1871, expressly authorizing the Secretary of War to make an

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equitable settlement of the litigation, and also because this company is intimately connected with the Pennsylvania system of roads, and is largely owned by your constituents. As a resident of East Tennessee, representing the State in Congress, I have felt called upon to urge upon the Secretary of War a prompt and liberal settlement of the litigation of which I speak. I am confident that, considering the facts in the case, as stated by Mr. Wilson, and which I am sure are substantially correct, injustice would not be done the government, and, on the other hand, well-merited recognition would be extended to the people of East Tennessee, whose prosperity is largely involved in the success of this railroad, if the United States should release and dismiss the suits without any further payments by the company; but for the sake of peace and to end an injurious controversy, the company offers to pay quite a large additional sum, which beyond all doubt ought to be accepted.

If, after fully examining the facts, your conclusions should concur with mine, you will do an act of justice to our people and confer a favor upon me by co-operating in securing a fair adjustment of the lawsuits, in accordance with the act of Congress.

Very respectfully,

W. G. BROWNLOW.

Hon. SIMON CAMERON,
U. S. Senator.

A true copy.

_____,
Depy. Qr. Mr. Genl., U. S. A.

Q. M. G. O., *July* 24, '82.

Respectfully forwarded to the Sec'y of War. I hope he can fully meet the wishes of Senator Brownlow in regard to an adjustment of the within case on the basis of offer made by the company. Liberal adjustments with Southern roads must prove beneficial to the government and the people of those sections.

V'y resp'y,

SIMON CAMERON.

JAN'Y 16, 1872.
A true copy.

J. G. CHANDLER,
Depy. Qr. Mr. Genl., U. S. Army.

Q. M. G. O., *July* 24, '82.

WASHINGTON, *Jan.* 17, 1872.

MY DEAR MAYNARD: I have read your note, with enclosures relative, to a controversy between the government and the East Tennessee, Virginia and Georgia Railroads, and seize a few minutes amidst other engagements to give it an early answer.

When the matter of the Southern railroads was before the Committee of the Judiciary in the last Congress, I was called upon to give the subject very thorough attention, and as my remembrance serves me, one of the questions discussed in the committee was how far we should, by the bill which subsequently became the act passed March 3, 1871, open the equities of the case, and the opinion of the majority of the committee which prevailed was in favor of opening all the equities fully for consideration in the compromise, and we embodied that idea in the act. I supposed that the whole question was whether the accounting officers of the government had any power to consider the equities between the roads and the government, and that it was necessary to pass this bill in order to give them power; that in case they had the power, they were fully ready to consider all equities and equitable claims subsisting between the parties. In this view of the matter I drew a bill and pushed it before the committee, and got their consent to have it reported, providing for a commission to be appointed to take all these rights into consideration and settle them as an arbitration might, with full equitable powers to do justice between the parties independent of any rules of law or technical rules of equity; and I understood, further, that the reason why the bill giving this into the hands of the Secretary of War to settle was agreed to, was that it was understood that he was to act as this equitable arbitration instead of referring it to a commission where there might be delays and possibly resulting litigation.

You see, therefore, that I have no doubt, not only of the power, but of the expediency and propriety that the Secretary of War should consider all the equities which may be fairly claimed for the roads, independent of any technical rules of evidence or technical estoppels. In other words, if he should be convinced, for example, that the railroad property was purchased by the roads at a higher price than they would otherwise have given because of supposed offsets which they claimed against the United States, and which the Secretary of War does not now feel himself at liberty to allow, I see no reason why he should not consider that price of the material thus enhanced, in making the compromise of the debt, incurred in the purchase.

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If my views are of any use to aid in bringing the unfortunate controversy to a termination, they are quite at your service.

I am, my dear sir, very truly, yours,

BENJ. F. BUTLER.

Hon. HORACE MAYNARD,
Ho. of Reps., Washington, D. C.

Mr. MAYNARD: In compliance with your request, I give it as my opinion that by the letter & spirit of the act referred to within by Genl. Butler, the Secretary of War is authorized to settle the matter referred to him on such terms as he may deem fair & reasonable without regard to the rules which control courts of law in equity in judicial proceedings.

Very truly, yours,

JNO. A. BINGHAM.

A true copy.

J. G. CHANDLER,
Depy Qr. Genl., U. S. Army.

Q. M. G. O, *July* 24, '82.

HOUSE OF REPRESENTATIVES,
COMMITTEE OF WAYS AND MEANS,
Washington, D. C., Sept. 18th, 1871.

GENTLEMEN: I beg permission to invite your attention to the proposal made on the 31st of July last, by R. T. Wilson, esq., pres't, &c., with a view to the adjustment & settlement, under the act of Congress of 3d March, 1871, of the claims of the United States against the East Tenn. & Va. & the East Tenn & Geo. Railroads.

These two roads form a continuous line running through Eastern Tennessee from Virginia to Georgia. They were built only after many years of effort and a great sacrifice by the people of that secluded region, and are identified with its material prosperity.

The sufferings of these people by the war are now historical; first when held in unwilling and galling subjection by the rebel forces until the Federal occupation in Sept., 1863, & after that alternately by the two armies, operating very often with no base of supplies, & living off of the country, so that it would be difficult to say whether in fact they suffered less from their friends than from the enemy.

While it is true that the government has paid for very much property thus taken or used, and will undoubtedly pay for more, there still remains a heavy balance of losses that admit & will receive no direct compensation. The virtual exclusion of the people from the use of the railroads, while in military possession, is of this character.

The exceptional attitude of the people of East Tennessee was early recognized by Congress in appropriating two millions, early in the war, for organizing troops there, & by the President in excepting them from the emancipation proclamation.

The same policy of indirect compensation for their sufferings & losses undoubtedly dictates the terms upon which these railroads, in August, 1865, were restored to their former owners; so understood at the time both by the officers of the government & the officers of the railroads.

Without extending these general observations, which would be to repeat what I have more than once urged orally, & in writing, & without stating what my own estimate of the several equities is, I conclude by saying that, in my judgment, the government should not hesitate a moment to accept the proffered terms, viz, $120,000, and costs not to exceed $10,000 more.

I have the honor to be, very respectfully, your ob't servant,

HORACE MAYNARD.

Hon. WILLIAM W. BELKNAP,
Secretary of War.
Hon. AMOS T. AKERMAN,
Attorney-General.

A true copy.

J. G. CHANDLER,
Depy. Qr. Mr. Genl., U. S. Army.

Q. M. G. O., *July* 24, 1882.

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47TH CONGRESS, 2d Session. | SENATE. | Ex. Doc. No. 9.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

In compliance with law, the report of the Board of Engineer Officers upon the improvement of Calumet River, Illinois.

DECEMBER 9, 1882.—Referred to the Committee on Commerce and ordered to be printed.

WAR DEPARTMENT,
Washington City, December 9, 1882.

The Secretary of War has the honor to transmit to the United States Senate, in compliance with the requirements of the river and harbor act of August 2, 1882, a letter from the Chief of Engineers, United States Army, dated December 7, instant, submitting a copy of report and map from a Board of Engineer Officers upon improvement of Calumet River, Illinois; and also a draft of a bill for legislation which, if adopted, will, it is believed, prevent encroachments being made or maintained within the limits of the channel of the Calumet River.

ROBERT T. LINCOLN,
Secretary of War.

The PRESIDENT *pro tempore*,
United States Senate.

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, D. C., December 7, 1882.

SIR: I have the honor to submit herewith a report, with map, from the Board of Engineer Officers constituted to comply with the following requirements of the river and harbor act of August 2, 1882:

Improving harbor at Calumet, Illinois: Continuing improvement, thirty-five thousand dollars: *Provided*, That with a view to the improvement of the Calumet River, in the State of Illinois, from its mouth to the fork at Calumet Lake, the Secretary of War shall appoint a Board of Engineers who shall examine said river and report upon the practicability and the best method of perfecting and maintaining a channel for through navigation to said fork at Lake Calumet, adapted to the passage of the largest vessels navigating the Northern and Northwestern lakes, limiting and locating the lines of channel to be improved by the United States, and of docks that may be constructed by private individuals, corporations, or other parties, and clearly defining the same under the direction of the Chief of Engineers, United States Army; and the

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Secretary of War shall report to Congress the result of said examination, and the e mated cost of the proposed improvement; also, what legislation, if any, is necess to prevent encroachments being made or maintained within the limits of the chan designated as above provided for.

The accompanying map clearly defines the limiting lines of chan to be improved and of docks that may be constructed.

The views and recommendations of the Board are commended favorable consideration.

Very respectfully, your obedient servant,

H. G. WRIGHT,
Chief of Engineers, Brig. and Bvt. Maj. Gen

Hon. ROBERT T. LINCOLN,
Secretary of War.

IMPROVEMENT OF CALUMET HARBOR, ILLINOIS.—REPORT OF TH BOARD OF ENGINEER OFFICERS CONSTITUTED TO COMPLY WI REQUIREMENTS OF THE RIVER AND HARBOR ACT OF AUGUST 1882.

UNITED STATES ENGINEER OFFICE,
Chicago, Ill., October 6, 1882.

GENERAL: The Board of Engineer Officers convened by Special Orde No. 84, current series, from Headquarters Corps of Engineers, to exa ine and report upon the proposed improvement of the Calumet Riv Illinois, has the honor to present the following report:

The Board was required to examine the river and to report upon th practicability and the best method of perfecting and maintaining channel for through navigation to the fork of the river at Lake Calume adapted to the passage of the largest vessels navigating the Northe and Northwestern lakes, and to limit and locate the lines of channel t be improved by the United States, and of docks that may be constructe by private individuals, corporations, and other parties, and clearly defin the same; also, to present estimates of the proposed improvement, an to designate the legislation necessary to prevent encroachments bein made and maintained within the limits of the channel designated.

The Board met at the United States Engineer office at Chicago, Ill on the 3d instant, and continued in session several days in the execu tion of the duties assigned. The maps and other sources of informatio bearing upon the subject were consulted, and a personal examinatio of the river was made from Lake Michigan to Lake Calumet.

There are no engineering difficulties presented in the way of excavat ing and maintaining a navigable channel from Lake Michigan to th forks of the river near Lake Calumet, and with proper regulations it i believed that after the completion of the channel the cost of mainten ance will be comparatively small.

The largest class of vessels navigating the Northern and Northwest ern lakes draw about 15 feet, and it is desirable that the river depth should be somewhat more than that at all stages. As the water leve in the river depends upon that in Lake Michigan, which is subject to considerable fluctuations, the depth of channel should at least be 16 feet below the mean level of its surface.

It is the opinion of the Board that the importance of this improve ment, together with the necessity for avoiding legal complications, jus tifies the recommendation that the channel to be improved and con trolled by the government be in general 200 feet in width, and that the boundaries of this channel be established as a dock line to limit any construction by private parties or corporations.

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It is considered desirable to limit the channel as far as practicable by straight lines, a full description of which it has not been deemed necessary to insert in the report. They are, however, fully outlined in the accompanying map, together with the ownership of the bordering lands. As these lands belong to private and corporate parties, and as it will be necessary in some instances to encroach thereon in the furtherance of this project, it is recommended that no part of the improvement be undertaken until the right of way be conveyed to the government, and that it be fully released from all liability for damages to adjacent property. The lands bordering the river are low, marshy, and covered with water at times, and without the improvement of the channel are of comparatively little value. In presenting this project the Board does not intend to limit the distance between the docks to the width of 200 feet; on the contrary, it is desirable to have it wider, and to have slips constructed; but any excess beyond the width fixed upon by the government should be improved by adjacent owners, the expense to the United States being limited to the excavation and maintenance of the channel of 200 feet herein recommended.

The Board approves of the recommendation of Major Lydecker that the work be done by machinery owned by the government, experience having shown conclusively that by this means the expense will be much less than by contract. In addition it may be stated that it will be necessary to retain one of the dredges, after the completion of the work, in order to keep and maintain the channel to its original depth and width, as undoubtedly more or less filling will occur from time to time.

It is the opinion of the Board that some legislation is necessary in order to prevent obstruction to the channel by vessels and other water craft, as well as to prevent encroachments upon the channel by parties using or owning the docks, and that a general law should be enacted, the main points of which are embodied in the draft herewith.

ESTIMATES.

The amount of material required to be excavated to make a channel in the Calumet River from Lake Michigan to the forks, 200 feet wide and 16 feet deep, is, in round numbers, 2,500,000 cubic yards. The lowest average price per cubic yard at which such work has been done by contract in this locality is 25 cents; this would amount to $625,000.

The Board, however, recommend that the work be done by the government owning its own dredges; the estimated cost being:

For dredges and outfit	$100,000 00
2,500,000 cubic yards, at 5 cents	125,000 00
Total	225,000 00

This latter estimate is based upon the assumption that sufficient funds are appropriated at the outset to provide the necessary plant and perform a season's work.

D. C. HOUSTON,
Lieutenant-Colonel of Engineers, Brevet Colonel.
JARED A. SMITH,
Major of Engineers.
W. H. H. BENYAURD,
Major of Engineers.

Brig. Gen. H. G. WRIGHT,
Chief of Engineers, U. S. A.

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AN ACT to preserve and prevent encroachment upon the excavated channel of the Calumet River Illinois.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That from and after the passage of this act, the Secretary of War is directed to assume full control over the channel of the Calumet River, to be improved by the government, so far as the same may be necessary to prevent encroachment being made upon the improved channel-way, or any part of it that may be in course of excavation and improvement, and also to keep the same open and free from all obstructions, and he may establish such rules and regulations respecting the use of or passage through the said channel as he may deem necessary to protect the same and to facilitate the contemplated improvement.

Such regulations shall be conspicuously posted at the entrance of the harbor of Calumet, and copies of the same shall be printed in two daily papers of the city of Chicago.

These regulations may be changed from time to time, should it be deemed expedient for the better protection of the channel.

That it shall be the duty of all persons navigating said channel, or using it and its bordering docks, to observe the regulations prescribed by the Secretary of War, as aforesaid, and any person who shall willfully or negligently obstruct said channel, or make or attempt any encroachment upon the same, or cause any impairment, injury, filling up, or shoaling thereof, or who shall fail to obey and observe any of the prescribed regulations, shall be liable to a penalty of not less than fifty dollars nor more than five hundred dollars, to be recovered by information or by action of debt, with cost of suit, in the district court of the United States for the northern district of Illinois. And if such damage or injury to said channel or its approaches be caused by any steamer, vessel, or water craft, or by the masters or other persons in charge thereof, or if the master or other persons in charge of such vessel shall willfully or negligently violate the regulations aforesaid, a penalty of not less than fifty dollars nor more than five hundred dollars shall be incurred, and such vessel shall be liable for the penalty aforesaid, and may be proceeded against by way of libel for the recovery thereof in any court of the United States within whose jurisdiction such vessel may be found.

That all bridges that may hereafter be constructed across the Calumet River shall be built and located under and subject to such regulations for the security of navigation and the maintenance of a free and unobstructed channel as the Secretary of War shall prescribe, and to secure that object the company, corporation, or other party desiring to build a bridge shall submit to the Secretary of War, for his examination and approval, drawings, with proposed location of such bridge, together with all information that may be necessary for a satisfactory understanding of the matter, and until the said plan and location be approved by the Secretary of War, said bridge shall not be erected.

Should any bridge constructed under this authority be found an obstruction to the free and convenient navigation of the said river, it shall be subject to modification or removal, at the expense of the owners thereof. And the authority for its construction may at any time be revoked by act of Congress, should the public good so require.

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47TH CONGRESS, 2d Session. } SENATE. { Ex. DOC. No. 10.

LETTER

FROM THE

SECRETARY OF THE INTERIOR,

TRANSMITTING,

In answer to Senate resolution of the 7th instant, copies of agreements with certain parties for privileges in Yellowstone Park.

DECEMBER 11, 1882.—Ordered to lie on the table and be printed.

DEPARTMENT OF THE INTERIOR,
Washington, December 11, 1882.

SIR: In compliance with a resolution of the Senate passed on the 7th instant directing "the Secretary of the Interior to transmit to the Senate copies of any contracts entered into by the Interior Department in regard to leasing the Yellowstone National Park, or any part of said park, to any person or company, with the privilege of erecting hotels, constructing telegraph lines, and running stages therein, together with such other information as to the condition and management of the park as he may think important," I have the honor to transmit herewith a copy of an agreement made by this department on the 1st of September last with Messrs. Carroll T. Hobart, of Fargo, Dak., and Henry F. Douglas, of Fort Yates, Dak., and also a copy of a letter of this department to Maj. James S. Brisbin, U. S. A., dated July 27, 1882, granting him the privilege of running a steamboat on the Yellowstone Lake. These are the only agreements granting privileges in the Yellowstone Park which have been made by this department up to this date.

During the past summer reliable reports were frequently received at this department that the cones of the great geysers were being defaced by visitors; that the forests upon large tracts of the park were being destroyed by their carelessness in kindling fires, and that the game was also being rapidly destroyed.

In view of these and the further fact that competent persons estimate that during the coming season thirty thousand tourists will visit the park, and that there are no suitable accommodations for visitors and no means to protect the curiosities within the park from injury, it became important to adopt measures to protect the park with the least possible expense to the government. This department therefore determined, under the authority given by the act of Congress approved March 1, 1872, to lease portions of the park to responsible parties who would take a large force of persons there who would be interested in its care and protection. This was the view upon which the contract with Messrs. Hobart and Douglas was made. I inclose herewith a copy of an agreement which this department proposes to execute with Messrs.

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Hobart and Douglas, and Rufus Hatch, of New York City, to carry out the purposes of the original agreement. It is believed that the course pursued is the best which could be adopted for carrying out the purposes for which the park was set aside.

Very respectfully,

H. M. TELLER, *Secretary.*

The PRESIDENT OF THE SENATE *pro tempore.*

AGREEMENT.

This agreement, made and executed the first day of September, 1882, by and between Merritt L. Joslyn, Acting Secretary of the Interior, for and on behalf of the United States, party of the first part, and Carroll T. Hobart, of Fargo, Dakota Territory, and Henry F. Douglas, of Fort Yates, Dakota Territory, parties of the second part, for themselves, their heirs, executors and assigns, and such other parties as may hereafter be associated with them: Witnesseth, That the said parties have covenanted and agreed, and by these presents do covenant and agree, to and with each other as follows:

ARTICLE 1. That the said party of the first part, by virtue of the authority conferred by an act of Congress entitled "An act to set apart a certain tract of land lying near the headwaters of the Yellowstone River as a public park," approved March 1, 1872 (Stats., Vol. 17, ch. xxlv, now sections 2474 and 2475 of the Revised Statutes), and in consideration of the rents, covenants, and agreements hereinafter and by these presents mentioned, reserved, and contained, hereby agrees to lease unto the said parties of the second part such parcels of land within the said park as may be selected by the said parties of the second part, necessary to fully carry out the objects and purposes hereafter mentioned of the parties to this agreement; the location of said land and the quantity thereof to be subject to the approval of the Secretary of the Interior. And the party of the first part hereby agrees that upon the receipt of surveys and plats of such locations, to be made and presented by or on behalf of the parties of the second part and without expense to the United States, he will execute and deliver unto the parties of the second part a valid lease for a term of not exceeding ten years for such parcels and quantity of land as may in the discretion of the Secretary of the Interior be necessary for the purposes of this agreement as hereinafter set forth, and not incompatible with the interests of the government and the objects for which the said park was established.

ARTICLE 2. And the party of the first part hereby agrees to permit the party of the second part to use for the purpose of constructing the building hereinafter mentioned and for proper repairs and additions to the same and for fuel for heating such buildings and for telegraph poles and other necessary uses and objects, so much of the timber, coal, and other material within the said park as may be required for such purpose and not necessary to be reserved for the use and purposes of said park as declared in said act of Congress or by the regulations of the Department of the Interior; to be taken from such parts only of the park as may be designated by the Secretary of the Interior or other person duly authorized on behalf of the United States. And the parties of the second part agree to keep or cause to be kept a true and faithful account of all such timber and other materials taken from the park and used by them at any time for the purposes aforesaid, and to furnish quarter-annually a statement of the same to the Secretary of the Interior, commencing on the first day of January, 1883.

ARTICLE 3. And the party of the first part hereby agrees that the parties of the second part shall have the use of arable land within the park (the quantity and location of the same to be subject to the approval of the Secretary of the Interior) for the purpose of raising supplies of vegetables, grain, and forage for the use of the parties of the second part within the park. This privilege to be revoked at any time whenever the Secretary of the Interior may deem such revocation to be necessary for the protection of the public interests.

ARTICLE 4. And the party of the first part hereby agrees to permit the parties of the second part to have and enjoy the free use of the waters of the park for supplying the hotel and other buildings (including bath-houses) hereinafter mentioned, and for use as power for such machinery as may be erected by them in pursuance of the terms of this agreement: *Provided however*, That no appropriation of such waters by the parties of the second part shall exceed the quantity required for necessary and convenient use of the same except as may be required for the purposes herein specified. And nothing herein contained shall be construed as conferring upon the parties of the second part the privilege of altering the natural courses of any of the waters of the park or diverting the same without the approval of the Secretary of the Interior first obtained.

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ARTICLE 5. And in consideration of said lease and of the other privileges herein mentioned and granted by the party of the first part, the parties of the second part agree to pay unto the Secretary of the Interior such annual rental for the land to be leased to them, as herein provided, as may hereafter, and upon the execution of a lease, therefor, be mutually agreed upon, not to exceed the sum of two dollars ($2) per acre.

ARTICLE 6. And the said parties of the second part agree to erect or cause to be erected, within the limits of the Yellowstone National Park, one principal building, to be used and operated by them, or under their control and direction, as a hotel, and such auxiliary buildings, including bath-houses, as may be necessary and adequate to the accommodation of visitors to the park. Said hotel and other buildings and bath-houses to be erected upon sites to be designated by the Secretary of the Interior, and of such design and dimensions as he may approve.

ARTICLE 7. And the parties of the second part agree to provide and equip such lines of stages and such other livery accommodations as may be deemed necessary by the Secretary of the Interior for the comfortable and expeditious conveyance of passengers to and from the boundaries of the park nearest the most convenient and accessible railway station or stations, and to and from all the points within the park, of interest to visitors; and to furnish guides to point out to visitors the natural curiosities and wonders within the park.

ARTICLE 8. And the parties of the second part hereby agree to place upon the waters of the park yachts and other sail-boats and row-boats for the use and pleasure of the visitors to the park: *Provided, however*, That nothing herein contained shall be construed to conflict in any way with any privilege which may have been heretofore granted by the Secretary of the Interior to any other person or persons for the building and operating of a steamboat upon the Yellowstone Lake.

ARTICLE 9. And the parties of the second part hereby agree to construct and operate a line of telegraph from the hotel herein provided for and such other points within the park as may be required for the public convenience and accommodation, and to receive and transmit upon said telegraph line, free of charge, all messages to and from any officer or employé of the United States relating to government business.

ARTICLE 10. And the parties of the second part hereby agree to establish stores or trading stations at such points within the park as may be required by the necessities of the public and approved by the Secretary of the Interior.

ARTICLE 11. And the parties of the second part hereby agree to prepare and submit to the Secretary of the Interior an itemized schedule or tariff of the charges to be paid for each and every accommodation furnished and service rendered by them as herein provided; and no charges shall be demanded or received from any person by or on behalf of the parties of the second part until such schedule of items and charges shall be approved by the Secretary of the Interior; nor shall any payment be at any time demanded or received by or on behalf of the parties of the second part, or any person in their employ or under their control, for any accommodation or service not specified in said schedule or tariff approved by the Secretary of the Interior, nor in any greater amount than therein approved.

ARTICLE 12. And the parties of the second part hereby agree to observe and obey at all times such rules and regulations as have been, or may hereafter be, from time to time, established and published by the Secretary of the Interior, or by his direction, for the care and management of the park, and to require and enforce obedience to the same on the part of all persons employed by them or under their control within the said park. And they further agree to require that all persons employed by them or under their control at any time within the said park shall wear a uniform or badge by which they may be known and distinguished as the servants or employés of the said parties of the second part; and that they will not employ or retain in their service in any capacity, or permit to remain upon any of the premises or within any building herein mentioned or provided for, or which may hereafter be occupied or controlled by the parties of the second part within the said park, any person or persons whose presence within the said park shall be deemed and declared by the Secretary of the Interior, or by such officer as may represent him in the immediate management and superintendence of the park, to be subversive of the good order and management thereof.

ARTICLE 13. And it is agreed by and between the parties hereto that in case of a failure to renew such lease or leases, or any part of the same, or to enter into new terms for continuance of possession, by said parties of the second part, the buildings upon such sites and the permanent improvements thereon, or on any of such sites, surrendered to the government, shall become the sole and absolute property of the United States, subject to such compensation therefor as may be granted by Congress; it being also expressly understood that nothing herein shall be construed to bind or commit the United States to the payment of any sum or amount of money or other compensation whatsoever; but the said parties agree to leave the whole subject-matter of such compensation to the just judgment and consideration of Congress.

ARTICLE 14. And it is agreed by and between the parties hereto that each and every

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clause of this agreement wherein the parties of the second part stipulate and agree to perform any act tending to the entertainment, comfort, convenience, or pleasure of visitors to the park shall be construed not only as an obligation on the part of the parties of the second part to perform such agreement, but also as a grant on the part of the party of the first part of the privilege to do and perform such act. And in consideration of the covenants, agreements, and stipulations of the parties of the second part herein contained the party of the first part hereby agrees that the parties of the second part shall have and enjoy the privileges herein and hereby conferred and granted, to the exclusion of any other person or persons, for the term of ten years commencing from the date of the first lease hereafter to be granted under the provisions and stipulations of this agreement.

ARTICLE 15. And it is expressly understood by and between the parties hereto that each and every of the covenants, agreements, and stipulations herein set forth shall be subject to such rules and regulations as may have been or may hereafter be made and published by the Secretary of the Interior, or by his direction and authority, for the proper care, management, and improvement of the park or for fully carrying into effect the objects and purposes of the act of Congress by which the park was established and set apart. And the repetition of this provision in any clause of this agreement shall not be construed as a waiver of the same as regards any other clause or clauses.

ARTICLE 16. And it is expressly understood by and between the parties hereto that no transfer or assignment of any lease made by the party of the first part, in pursuance of this agreement, or of any privilege hereby conferred, shall be valid or recognized by the party of the first part, unless such assignment be first approved by the Secretary of the Interior.

ARTICLE 17. And it is further agreed that, before the party of the first part shall be bound by this agreement, the parties of the second part shall furnish a joint and several bond in the sum of ten thousand dollars ($10,000), duly executed to the United States of America, with two or more good and sufficient sureties; said bond to be conditioned for the faithful performance of this agreement in all its particulars, by the parties of the second part.

ARTICLE 18. And it is agreed by and between the parties hereto that no member of or delegate to Congress, officer, agent, or employé of the government shall be admitted to any share or part in this agreement, or derive any benefit to arise therefrom.

ARTICLE 19. And it is further agreed by and between the parties hereto that this agreement may, by mutual consent, be changed, altered, modified, or abrogated, in whole or in part.

In witness whereof the undersigned have hereunto subscribed their names and affixed their seals the day and year first above written.

M. L. JOSLYN,
Acting Secretary of the Interior.
CARROLL T. HOBART.
HENRY F. DOUGLAS.

Witnesses:
URI J. BAXTER.
EDWD. M. DAWSON.

Executed in duplicate.

COPY OF PROPOSED LEASE.

Whereas, in the first article of an agreement made and executed on the first day of September, 1882, by and between Merritt L. Joslyn, Acting Secretary of the Interior, for and on behalf of the United States, of the first part, and Carroll T. Hobart and Henry F. Douglas of the second part, for themselves, their heirs, executors, and assigns, and such other persons as might thereafter be associated with them, the party of the first part agreed to execute and deliver unto the parties of the second part a valid lease, for a term of not exceeding ten years, for such parcels of land within the Yellowstone National Park as the Secretary of the Interior, in his discretion as to the location and quantity of the same, should deem necessary to carry out the purposes mentioned in said agreement;

And whereas the said Carroll T. Hobart and Henry F. Douglas have notified the Secretary of the Interior in writing, under date of the 6th day of December, 1882, that they have associated with themselves Rufus Hatch, of the city of New York, for the purpose of keeping and performing the covenants and purposes contained and set forth in said agreement: Now, therefore,

This indenture, made this —— day of ——, 1882, between Henry M. Teller, Secretary of the Interior, for and on behalf of the United States, party of the first part,

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and Carroll T. Hobart, of Fargo, Dakota, and Henry F. Douglas, of Fort Yates, Dakota, and Rufus Hatch, of the city of New York, parties of the second part, witnesseth:

That the said parties have covenanted and agreed, and by these presents do covenant and agree to and with each other, as follows:

That the said party of the first part, by virtue of the authority conferred by, and subject to the provisions and limitations contained in, an act of Congress, entitled "An act to set apart a certain tract of land lying near the headwaters of the Yellowstone River as a public park," approved March 1, 1872 (Statutes, vol. xvii, ch. xxiv, now sections 2474 and 2475 of the Revised Statutes of the United States), and in accordance with the provisions of the contract aforesaid, and in consideration of the rents, covenants, and agreements hereinafter and by these presents mentioned, reserved and contained, doth grant, demise, and lease unto the said parties of the second part the tracts and parcels of land lying within the Yellowstone National Park, described as follows:

1. Beginning at center of "Liberty Cap," thence N. 45° E. 3733$\frac{5}{10}$ ft. to a corner A, thence due west one mile to a corner, thence south one mile to a corner, thence east one mile to a corner, thence north one mile to a corner marked A, containing six hundred and forty acres.

2. Beginning at centre of "Old Faithful," thence N. 45° E. 3733$\frac{5}{10}$ feet to a corner marked A, thence due west one mile to a corner, thence south one mile, thence east one mile to a corner, thence north one mile to a corner marked A, containing six hundred and forty acres.

3. Beginning upon south bank of Madison River, at a point one mile east from the western boundary line of the park, thence south one-half mile to a corner, thence east one mile to a corner, thence north one mile to a corner, thence west one mile to a corner, thence south one-half mile to the place of beginning, containing six hundred and forty acres.

4. Beginning at the centre of "Soda Springs," thence N. 45° E. 3733$\frac{5}{10}$ feet to a corner marked A, thence west one mile to a corner, thence south one mile to a corner, thence east one mile to a corner, thence north one mile to corner marked A, containing six hundred and forty acres.

5. Beginning at the centre of Baronets Bridge, thence N. 45° E. 3733$\frac{5}{10}$ feet to a corner, thence west one mile to a corner, thence south one mile to a corner, thence east one mile to a corner, thence north one mile to the place of beginning, containing six hundred and forty acres of land.

6. Beginning at the head of Cañon or Great Falls, upon the westerly bank of the Yellowstone River, thence N. 45° E. 3733$\frac{5}{10}$ feet to a corner, thence west one mile to a corner, thence south one mile to a corner, thence east one mile to a corner, thence north one mile to place of beginning, containing six hundred and forty acres of land.

7. Beginning upon the bank of the Yellowstone Lake at the outlet, thence easterly along the bank of the lake one-half mile to a corner, thence north one-half mile to a corner, thence west one mile to a corner, thence south to the bank of the lake, thence northeasterly along the bank of the lake to the place of beginning, containing six hundred acres of land, more or less.

To have and to hold the above-described land unto the said parties of the second part and their heirs, executors, administrators, and assigns for and during the term of ten years, commencing from the —— day of ——, 1882, and ending on the —— day of ——, 1892, the parties of the second part paying rent therefor as hereinafter stated. And the party of the first part for himself and his successors in office, on behalf of the United States, hereby covenants and agrees that the parties of the second part shall have and enjoy the quiet and peaceable possession of the said land during the term aforesaid, subject to the conditions and limitations hereinafter set forth.

And the parties of the second part, in consideration of the leasing of the land aforesaid, do covenant and agree with the said party of the first part to pay, or cause to be paid, to the Secretary of the Interior, at his office in the city of Washington, or to such person and at such place as he may designate, a rental at the rate of —— dollars per year, commencing from the date and continuing for and during the term hereof, for each and every acre of land hereby leased unto the said parties of the second part. Said rental to be paid in equal quarter-annual instalments, the first of such payments to be made on or before the thirtieth day of March, 1883, and the succeeding payments to be made on or before the last day of each and every succeeding quarter.

And the said parties of the second part hereby covenant with the party of the first part, that at the expiration of the term mentioned in this lease, or upon the ending of said term by election of the party of the first part, as hereinafter provided in case of default of payment of rent in the manner stipulated, or failure to observe and keep the covenants herein contained, and also the covenants contained in the agreement before mentioned, dated September 1, 1882, to be observed and kept by the said parties of the second part, that they will peaceably surrender and deliver up the said demised land to the said party of the first part or his successor in office.

It is expressly understood and agreed by and between the parties aforesaid that if the rent above reserved, or any part thereof, shall be unpaid on the day and at the

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place of payment whereon the same ought to be paid as aforesaid, or if default sh be made in any of the covenants herein contained, or in any of the covenants co tained in the agreement hereinbefore mentioned, dated September 1, 1882, to be ke by the said parties of the second part, or their executors, administrators, and assig and if the parties of the second part shall not make such payment of rent or keep a perform such agreement within ninety days after due notice of default therein to given to the parties of the second part in writing by the Secretary of the Interic or his authorized agent, then it shall and may be lawful for the said party of the fi part, or his successor in office, agent or attorney, at his or their election, to decla this lease forfeited and the term thereof ended, and the demised land, or any pa thereof, either with or without process of law, to re-enter, and the parties of t second part, or any other person or persons occupying, in, or upon the same, to exp remove, and put out, using such force as may be necessary in so doing, and the sa premises again to repossess in behalf of the United States; and in the event of a rent being due and unpaid, whether before or after such forfeiture, to distrain f any rent that may be due upon any property belonging to the said parties of t second part, whether the same be exempt from execution or distress by law or no and the said parties of the second part hereby waive all legal right which they ma have to hold or retain any such property under any exemption law in force in or ov the said National Park; meaning and intending thereby to give to the party of t first part a valid and first lien upon any and all the buildings, goods, chattels, or oth property belonging to the said parties of the second part, within the said park, a security for the payment of said rent in manner aforesaid, anything herein contain to the contrary notwithstanding.

And it is further agreed by and between the parties hereto that the parties of th second part may occupy, subject to the terms and conditions of this lease, such oth parcels of land within the said park as the Secretary of the Interior may designat and that they will erect thereon such buildings as he may deem necessary for th accommodation of visitors to the park.

And it is expressly agreed by and between the parties aforesaid, that the said demise land shall be held, occupied, and used by the parties of the second part for the sol and exclusive purpose of executing and performing the covenants to be kept by th parties of the second part named in the agreement hereinbefore mentioned entere into on the first day of September, 1882.

And the parties of the second part shall not have the right to mine or remove from said demised land any gold, silver, copper or other precious mineral; nor to mine an coal, nor cut or remove therefrom any timber excepting for the purposes and under the restrictions set forth in article 2 of the agreement dated September 1, 1882.

And it is understood by and between the parties hereto that the parties of the second part shall have control, (subject to such rules and regulations as have been or may hereafter be prescribed by the Secretary of the Interior) over the natural curiosities and wonders lying within the limits of the land hereby demised, to prevent the injury or destruction of the same, but in no wise to interfere with the supervision of the government over said park. And the parties of the second part hereby agree not to permit any person in their employ or under their control to injure or destroy any mineral deposit, natural curiosity, or wonder lying within or situated upon the land hereby demised. And the said parties of the second part further agree, in consideration of the said lease and without further charge or claim for compensation from the United States, to aid and assist the Secretary of the Interior or the lawfully appointed agents of the government, in the preservation and retention of said mineral deposits, curiosities, and wonders in their natural condition; *provided*, however, and it is expressly understood, that nothing herein contained shall be construed as conferring upon the parties of the second part any right or privilege to restrict or prevent or in any way interfere with the free and unrestrained access of the public to any of the curiosities, wonders, and other points of interest to visitors within the said park. Nor, in case any of the land hereby demised shall border upon the Yellowstone Lake or other of the waters of the park, as conferring upon the parties of the second part a right to interfere with the approach of boats to said land and the landing of passengers thereon.

And it is further agreed that if upon any survey hereafter made of the land hereby demised any error of description be discovered, the description of said land herein contained shall be corrected to correspond with such survey.

And it is understood by and between the parties hereto that no transfer or assignment of this lease shall be valid or recognized by the party of the first part unless such assignment be first approved, in writing, by the Secretary of the Interior.

And it is further agreed by and between the parties hereto that the several covenants and stipulations contained and set forth in the agreement hereinbefore mentioned, dated September 1, 1882, shall, be and are hereby, made a part of this lease so far as they may be applicable thereto.

And it is further agreed by and between the parties hereto that no member of or delegate to Congress, officer, agent, or employé of the government shall be admitted to any share or part in this agreement, or derive any benefit to arise therefrom.

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DEPARTMENT OF THE INTERIOR,
Washington, July 27, 1882.

SIR: The privilege of putting a steam-vessel for carrying passengers on the Yellowstone Lake in the Yellowstone National Park, requested by you in your letter of the 18th instant, is hereby granted.

When the steamer is completed, the law relative to the inspection of steam-vessels should be complied with.

The superintendent of the park has been notified of this grant.

Very respectfully,

H. M. TELLER,
Secretary.

JAMES S. BRISBIN, Esq.,
Fort Keogh, Montana.

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LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

In response to Senate resolution of May 31, 1882, requesting information relating to the disposition of hospital and grounds in Wilmington, N. C., a copy of a letter from the Secretary of the Treasury of the 6th instant, and accompanying copy of report of that department furnishing the desired information.

DECEMBER 11, 1882.—Referred to the Committee on Public Buildings and Grounds and ordered to be printed.

WAR DEPARTMENT,
Washington City, December 9, 1882.

SIR: In response to Senate resolution of May 31, 1882, directing the Secretary of War "to inform the Senate what disposition has been made of the government property known as the 'Hospital' and grounds in Wilmington, N. C., and what is being done to evict certain tenants on said grounds, and also the result of a previous sale of said property to King and another," I have the honor to state that the records of the department failing to afford the information desired, and the property in question being under the control of the Treasury Department, application was made thereto for the requisite information in the case.

I have now the honor to inclose herewith a copy of a letter to this department from the honorable the Secretary of the Treasury, dated the 6th instant, and its accompanying copy of report of the Solicitor of the Treasury, furnishing, it is believed, the information called for by the above mentioned resolution of the Senate.

Very respectfully, your obedient servant,

ROBERT T. LINCOLN,
Secretary of War.

The PRESIDENT *pro tempore*,
United States Senate.

TREASURY DEPARTMENT,
December 6, 1882.

SIR: Referring to your letter of the 6th of October, 1882, relative to the Marine Hospital property at Wilmington, N. C., I inclose for your information a copy of a report on the subject made by the Solicitor of the Treasury.

Very respectfully,

CHAS. J. FOLGER,
Secretary.

Hon. ROBERT T. LINCOLN,
Secretary of War.

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DEPARTMENT OF JUSTICE,
OFFICE OF THE SOLICITOR OF THE TREASURY,
Washington, D. C., December 4, 1882.

SIR: I have the honor to acknowledge the receipt of a letter from the Secretary of War, addressed to your office under date of October 6, 1882, inclosing a resolution of the Senate of the United States relative to the Marine Hospital property at Wilmington, N. C., which you have referred to this office for report as to what disposition has been made of said property, and what is being done to evict certain tenants who unlawfully accept a part of the same.

In reply, I have to inform you, that by virtue of an act of Congress approved April 20, 1866, the Marine Hospital and grounds situated at Wilmington, N. C., were sold at public auction in the month of December, 1870, to Dr. Francis King, for the sum of ($20,000), the terms of sale being one-fifth cash and the balance in four equal annual payments with interest. It was one of the conditions of the sale that the property should revert to the United States upon the failure of the purchaser to make any one of the annual payments, and that the purchase money paid at the time of such default should be forfeited.

The purchaser made two payments in accordance with the terms of the sale, amounting with interest to eight thousand nine hundred and seventeen dollars and seventy cents ($8,917.70). Failing to comply with the contract, he finally surrendered the property to the United States. Prior to this surrender, however, he had divided a portion of the property into small lots and sold them to poor colored people for homes.

Some of these purchasers, it appears, paid in full for their lots, and deeds were executed to them by King.

Subsequent to the surrender of the property Dr. King died. The Solicitor of the Treasury, to whom was referred the matter of perfecting the title, reported that an equity of redemption remained in the heirs of the purchaser, and, upon instructions received from the Secretary of the Treasury, the United States district attorney for the eastern district of North Carolina was directed to institute proceedings to foreclose the equity redemption.

Pending this litigation an offer of compromise was made in behalf of the defendants, in terms as follows:

"The defendants would consent to the entry of a decree perfecting the title of the government to said property, with the understanding that the Secretary of the Treasury would recommend that Congress make an appropriation of an amount sufficient to reimburse the purchasers of lots who had paid for them in full."

These conditions having all been complied with, a final decree was pronounced, vesting the title absolutely in the United States, and the money appropriated by Congress disbursed to the proper persons, and the property is now occupied by the government as a marine hospital, excepting, perhaps, a few of the lots, which may still remain in the possession of trespassers. As to these, the district attorney has been directed to institute requisite proceedings to eject them from the premises.

Very respectfully,

K. RAYNER,
Solicitor of the Treasury.

Hon. CHAS. J. FOLGER,
Secretary of the Treasury.

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47TH CONGRESS, 2d Session. } SENATE. { Ex. Doc. No. 12.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

In compliance with Senate resolution of December 12, 1882, estimate for improving the Potomac Flats during the next fiscal year.

DECEMBER 14, 1882.—Referred to the Select Committee on the Potomac Flats and ordered to be printed.

WAR DEPARTMENT,
Washington City, December 13, 1882.

Sir: In compliance with the resolution of the Senate of December 12, 1882, I herewith transmit the estimate for improving the Potomac Flats during the next fiscal year, amounting to $800,000.

Very respectfully,

ROBERT T. LINCOLN,
Secretary of War.

Hon. DAVID DAVIS,
President pro tempore United States Senate.

Estimates of appropriations required for the service of the fiscal year ending June 30, 1884, by the Engineer Department.

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Amount appropriated for the current fiscal year ending June 30, 1883.
Improving Potomac River in the vicinity of Washington; establishment of harbor lines and raising the flats.		
Improvement of navigation, the establishment of harbor lines, and the raising of the flats, in accordance with the plan and report made in compliance with the river and harbor act of March 3, 1881, and the reports of the Board of Engineers made in compliance with the resolution of the Senate of December 30, 1881 (appropriated, Stat. at L., vol. 22, p. 198, sec. 1)	$800,000 00	$400,000 00

Respectfully submitted to the honorable Secretary of War.

H. G. WRIGHT,
Chief of Engineers, Brigadier and Brevet Major General.

OFFICE OF THE CHIEF OF ENGINEERS,
Washington, D. C., September 1, 1882.

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LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

In compliance with law, a letter from the Chief of Engineers, of the 11th instant, inclosing copies of reports respecting the examiaation of the mouth of Columbia River, Oregon, &c.

DECEMBER 15, 1882.—Referred to the Committee on Commerce and ordered to be printed.

WAR DEPARTMENT,
Washington City, December 14, 1882.

The Secretary of War has the honor to transmit to the United States Senate, in accordance with the requirements of the river and harbor act of August 2, 1882, a letter from the Chief of Engineers, dated the 11th instant, inclosing copies of the majority and minority reports, respectively, from the Board of Engineers appointed to examine in detail the mouth of the Columbia River, Oregon, and to report a plan with estimates for its permanent improvement.

ROBERT T. LINCOLN,
Secretary of War.

The PRESIDENT *pro tempore*,
United States Senate.

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, D. C., December 11, 1882.

SIR: I have the honor to submit herewith a copy of the report, with plan and estimates, of the Board of Engineer officers constituted in compliance with provisions of the river and harbor act of August 2, 1882, making appropriation "for the expenses of a Board of Engineers to examine in detail the mouth of the Columbia River, Oregon, and report such plan, with estimates, for its permanent improvement, as they approve, the said Board being required to report before the next session of the present Congress," together with a report upon the same subject presented by a minority of the Board.

Very respectfully, your obedient servant,

H. G. WRIGHT,
Chief of Engineers,
Brig. and Bvt. Maj. Gen.

Hon. ROBERT T. LINCOLN,
Secretary of War.

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REPORT OF THE BOARD OF ENGINEERS FOR THE PERMANENT IMPROVEMENT OF MOUTH OF COLUMBIA RIVER, OREGON.

SAN FRANCISCO, CAL., *October* 13, 1882.

The Board of Engineers constituted by paragraph 2 of Special Order No. 82, Headquarters Corps of Engineers, August 18, 1882, "to examine in detail the mouth of the Columbia River, Oregon, and report such plan with estimates for its permanent improvement as they approve," has the honor, after making a personal examination of the mouth of the river, and a full conference with pilots and others familiar with it, and after special consideration of commercial statistics as presented by the boards of trade of Astoria and Portland, to submit the following report.

The Columbia River enters the Pacific Ocean between Cape Disappointment (Hancock) and Point Adams. The former is a rocky headland of about 200 feet in height, and the latter a low, changeable, sandy point, 6 miles distant in a south-southeast direction. Taking this line as part of a chord, the curve of 30-foot* depths outside of the bar is convex toward the sea, and its vertex is about 4½ miles outside of this chord.

Inside of this 30-foot curve the water shoals rapidly to a sandy cordon, having on it, for large portions of its length, depths of water varying from 2 or 3 to 12 or 15 feet, but having channels through it which sometimes have reached 27 feet in depth. The depths in the channels and on the sands intervening vary widely at different times. The length of this cordon, measured on the exterior 30-foot curve, is about 12 miles.

From Point Adams a broad, sandy spit, called Clatsop Spit, runs to the northwest, the vertex of its 18-foot curve being 3 miles from Point Adams. A similar spit, called Peacock Spit, runs from Cape Disappointment 1¼ miles to the south-southwest.

Inside of the sandy cordon the river is an estuary for 26 miles, varying in width between 3 and 9 miles; it then becomes an ordinary river of about a mile in width.

The low-water cross-section of the river between Point Adams and Chinook Point is about 420,000 square feet, and the width 3½ miles. This section seems to be stable, as it has varied little in the last forty-one years.

Between this section and the sand cordon an island called Sand Island is shown on the chart of 1839, and on all subsequent ones. It has undergone great variations in form and position, and has had its influence on the depths of channels. It will be adverted to hereafter.

An examination of the general chart of the coast shows a narrow sand spit running north for 25 miles, from the general headland of which Cape Disappointment is a part, to the entrance of Shoalwater Bay, and separating this bay from the ocean. On the south side of the mouth of the river, near Point Adams, the sand point is 1½ miles wide, and it continues as a sand beach for 17 miles southward to Tillamook Head, where it disappears. The prolongation of both these sandy points to the northward seems to indicate that the prevailing motion of the sands is in that direction, although this does not seem to be the case at all points on the coast of Oregon and California.

Off the mouth of the river the curves of equal depth show a bend seaward to the 20-fathom curve, where the bend disappears. The soundings increase at the rate of about 30 feet to the mile, reaching 300 feet 11 miles west of Cape Disappointment. Beyond a depth of

*All depths refer to low-water unless the contrary is stated.

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about 10 fathoms, mud is shown on the charts in some places, and as there is much evidence that the sea sometimes breaks in this depth it is supposed to be about the limit of depths at which the sea acts effectively on the sands.

The Coast Survey chart of the approaches to the Columbia River, 1878, states that 8 or 10 miles off the coast there is a current whose direction depends on that of the prevailing winds, being northerly in winter and southerly in summer. The season of storms is from November to April; they are called southeasters. The wind beginning in the southeast veers to the south and southwest, the storm ceasing when the wind gets round to the northwest. Sometimes storms are almost continuous for many days; they are accompanied and followed by an extremely heavy sea from the southwest, which often renders the bar unsafe or impracticable. Steam vessels are occasionally detained inside the bar for a week without daring to cross out. During winter and spring there is in some years a good deal of northeast wind, with cold weather. The river occasionally freezes below Portland. The summer wind is from the northwest. It is generally a good sailing breeze, although it sometimes increases to a moderate gale.

There are two tides daily, of unequal height, except when the moon's declination is zero, when they are equal. The mean rise and fall at Astoria is 6.1 feet. At low stages of the river the tide is perceptible for 150 miles above its mouth, and at that time the average tidal flow at the mouth for the six hours between the lower low-water and the higher high-water is estimated at about 1,000,000 cubic feet per second. As the tidal flow starts from zero, passes through a maximum and returns again to zero, its maximum value may be taken roughly as 2,000,000 cubic feet per second.

The fresh-water discharge of the river, at low stage, is estimated at about 90,000 cubic feet per second; at mean stage at 300,000, and in great floods at 1,000,000. As these great floods are not of long duration, it is evident that the tidal flow is much more important in its action at the mouth of the river than the river discharge proper.

At low stages of the river its water is clear and almost entirely free from sediment, and the local engineer is of opinion that the amount carried at high stages is not large. Pilots state that in floods muddy water is seen 20 or 30 miles out at sea; and this, taken in connection with the river velocities at flood and the sandy bed, leaves little doubt that the river contributes its quota of sand in aid of that moved along the ocean-shore by the waves and winds to form the large shoals at its mouth.

The maximum velocities of ebb currents in the channels are of course variable. Off Fort Stevens 4.5 miles per hour has been observed by Captain Payson. The coast pilot notes 3.4 miles between Point Adams and Sand Island, and 4.4 between the latter place and Cape Disappointment.

In a paper by Captain Powell, appended to this report, further details as to channels may be found.

The principal elements on whose combination and interaction the actual form of the mouth of the river depends have now been mentioned, and may be repeated. They are, tidal flow, river discharge, waves, and sand supply. These elements, that of the waves being omitted, have long maintained a river section at Chinook Point, about 3½ miles wide, with an average depth of 23 feet, and with maximum depths exceeding 36 feet. These forces, with the wave action included, should be able to maintain similar depths in a somewhat narrower section, at Cape Disappointment.

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Having given a general description of the mouth of the river, and of the forces acting there, it will be well to trace briefly the history of the mouth during the period for which it is known, at least in part. The first chart of the mouth, available, is that of Vancouver in 1792. It is on a small scale, and does not state that its plane of reference is low-water. But it contains numerous soundings, and the points that can be identified are correctly placed with reference to each other. The other charts cover more ground, are in greater detail, and seem to be reliable. The recent ones are exact. The chart of 1839 does not state its plane of reference, but the work indicates that it was low-water, perhaps the mean of lower low-water. In order of dates the charts are as follows:

1792. Vancouver. English Navy.
1839. Belcher's. English Navy.
1841. Wilkes's. United States Navy.
1851. United States Coast Survey. Hydrography of 1850.
1854. United States Coast Survey. Hydrography of 1852.
1874. United States Coast Survey. Hydrography of 1868.
1876. United States Engineer.
1878. United States Engineer.
1879. United States Engineer.
1880. United States Engineer.
1881. United States Engineer.

Starting from the deep water inside, which is shown on all these charts between Point Adams and Chinook Point, the chart of 1792 shows a single deep straight channel running west into the ocean, and having a least depth of 27 feet. If other or lateral channels existed, they are not shown. The southern edge of Peacock Spit bordered this channel on the north, at a distance from Cape Disappointment of three-fourths of a mile. The southern edge of the channel, 1½ miles wide, was formed by the northern edge of Clatsop Spit for a distance of 8 miles west from Point Adams; the outer 4-fathom curve being 6 miles west of a line joining Cape Disappointment and Point Adams. In the triangle formed by Cape Disappointment, Chinook Point, and Point Adams there was at this time nearly everywhere a depth of not less than 4 or 5 fathoms. The charts of 1839 and 1841 agree in essential points. They show that the sea end of the channel, while retaining a westerly direction, is yet 1½ miles further south than in 1792. The depth of 27 feet on the bar still exists. The chart of 1839 also shows a channel running southwest from the main channel, at a point 4½ miles west from Point Adams, with a least depth of 19 or 20 feet. This channel is not shown on the Wilkes map of 1841, his soundings not having covered that area. But by far the most important change is the appearance within the triangular area, already referred to, of Sand Island, the extent of whose shoal within the 18-foot curve was 4 square miles; the middle of the shoal was near the place where 30 feet of water existed in 1792.

A plausible theory to account for this shoal is the following: As Clatsop Spit lengthens the interval between the inside 30-foot curve north of Point Adams and the 30-foot curve outside of the sea end of the channel becomes very much greater than the interval between the 30-foot curves when measured directly across Clatsop Spit, and the shorter path becomes an easy route for the tidal flow. When this difference becomes too great, the tidal flow across the spit will form minor channels, which under favorable conditions may become main channels, leaving the part of the spit cut off an island or a shoal. Thus in 1792 Vancouver's chart shows Clatsop Spit 8 miles long while the width across it most probably did not exceed 3 miles. To-day by the main channel the

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interval between the 30-foot curve inside near Point Adams and outside of the bar is 7 miles, while across Clatsop Spit, where a minor channel now exists, it is but 3 miles. But the lack of surveys between 1792 and 1839 makes positive proof of such an origin for Sand Island impracticable.

Defining Sand Island Shoal by its 18-foot curve, the southern part of this shoal was in 1839 where the point of the 18-foot curve of Clatsop Spit now is. Since 1839 this shoal has had its southern side steadily eroded by the currents of the deep channel there, and its middle has moved north 1¼ miles, until it now joins other shoals in Baker's Bay on the north side of the river. In the same period the part above water has moved northwest 1¾ miles.

In 1841 there were channels giving 30 feet of water on the north and 27 feet south of Sand Island. As Sand Island moved north, the northern channel was gradually closed, so that now but 13 feet can be carried around its northern side. In 1839 and 1841 these channels joined west of Sand Island, thus giving a single main channel thence to the sea, with 27 feet of water. But in 1852 the minor channel shown in the survey of 1839, crossing Clatsop Spit, which extended 5½ miles west from Point Adams, had become a wide southerly channel, 3 miles west from Clatsop Beach, with 21 feet of water, there still being 27 feet in the sea end of the main or north channel. The part of Clatsop Spit thus cut off formed the Middle Sands, which in 1850 had already become continuous with the Sand Island Shoals, so that from the east of Sand Island two channels ran to the sea, separated by a shoal facing west-northwest, and 6 miles long.

The chart of 1868 shows that the south channel had become the main channel, having 25 feet of water, while the north channel had but 21 at its sea end. The south channel continued to be the main channel for but a few years, and in 1876, the date of the next survey, the north channel was the main one, having 22 feet, while the south one had but 20½.

The chart of 1881 shows the north channel at its sea end nearly in the position it had in 1792, or about one mile south of Cape Disappointment. There were 22 feet on the bar at its sea end. The south channel curves round to the southeast so as to be nearly parallel to Clatsop Shoal, and has but 19 or 20 feet of water with many lumps having less depths. The depth on the shoal connecting Sand Island with the Middle Sands was increased from 17 to 19 feet in 1880 by scraping. This depth has since increased, so that in May, 1882, the main channel passing south of Sand Island crossed the shoal with 21 feet of water to the north channel, and then ran into the sea, passing near Cape Disappointment and having 19 feet of water at its sea end. Sand Island has nearly disappeared as a separate shoal, and it only needs deeper water in the main channel and the continuance of the shoaling of the south channel to make the state of affairs apparently identical with that in 1792.

Nothing thus far has been said in reference to the changes of Clatsop and Peacock Spits, which limit the water-way on the south and north. Both are changeable, the former very much so. Its direction has varied from westerly, with a length of 8 miles in 1792, to northwesterly, with a length of 3¼ miles, in 1881. In 1839 its northern edge was but half a mile north of Point Adams, while in 1881 it was 2½ miles. The channel side of Peacock Spit has varied in direction from south to west, and its southern limit has been between three-quarters and 2½ miles south of Cape Disappointment at different times.

These spits and the channels interact, each changing the other. If a

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line be traced, which follows generally the highest points of sand, over Peacock Spit, the Middle Sands, and Clatsop Spit, it will be noticed that the depths on the shoal portions of this line vary considerably from time to time. Thus the survey of 1868 shows shoals bare at low-water stretching almost continuously from Point Adams for 2½ miles northwest. That of 1881 shows no such shoals, but instead it is thought there is an average depth on the same line of 4 or 5 feet with a minor channel crossing the spit with 10 or 12 feet in it. The survey of 1868 shows half a mile of Peacock Spit bare at low-water, while in 1881 all is covered. On the Middle Sands the first survey shows a considerable area with less than 6 feet on it, while in 1881 the depths are usually from 10 to 15 feet.

Such increase in depth on the shoals cannot fail to injure the channels through them, and the effect is seen on comparing the depths of 21 and 25 feet through the north and south channels in 1868 with the depths of 22 and 19 feet in 1881.

The reason why the excellent channels of 1792, 1839, and 1841 have been replaced by the bad ones of to-day is easily seen. At the former dates there was but one principal channel; now there are two or three, and there may then have been a less average depth on the shoal parts of the sandy cordon, though the charts do not make it certain.

In 1868 it is true that the south channel was the principal one and a good one, but this was coincident with the greatest elevations of Clatsop Spit, the Middle Sands, and Peacock Spit, shown by any of the surveys. This channel lasted but a few years. Its short duration compared with that of the northern channel, indicates a more efficient action at its site of the injurious forces. The spreading out of the tidal flow into a general flow over the ridge, 9 miles long, of the sandy cordon, or the splitting of it into several important channels must be expected to give bad channels. The diminution of depth on the shoals, or the concentration of main flow into one channel, must be expected to improve the depth of navigable water. In the past, so far as we have any evidence, a single main channel has always given a depth of 27 feet on the sea bar.

Having thus given a history of the mouth of the river, the question of its improvement may now be considered.

The problem before the Board is to present a suitable project for improvement of the mouth of the river as we now find it.

It is evident that the depth of water in the channels would be increased if the wide opening between Cape Disappointment and Point Adams were suitably diminished. Some idea of the proper measure of this diminution may be obtained from an examination of a section of the river near its mouth, where there has always been, as far as known, a sufficient depth of channel. Such a section is found between Chinook Point and Point Adams.

If the water-way between Cape Disappointment and Point Adams be narrowed to something less thanthat between Chinook Point and Point Adams, and the volume of the water be properly directed, we may reasonably expect as good a channel to be the result.

It may be supposed the best way to accomplish the object stated above would be to place a structure on the bar, leaving an opening between it and Cape Disappointment or Point Adams, or openings at both places. It is believed the construction of such a work would be impracticable. If practicable, the expense would be enormous.

A more satisfactory method of attaining the desired result presents itself. This is to build a single jetty from Point Adams so as to make

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the distance between its outer end and Cape Disappointment nearly the same as that between Chinook Point and Point Adams, and, inasmuch as at the section between Cape Disappointment and the proposed jetty the wave action is very potent, and does not exist at the Chinook section, it is thought best to make the new mouth of the river narrower than the present Chinook section.

It is to be observed also, in this connection, that Cape Disappointment is fixed, and its attached spit, the Peacock Spit, has been persistent. On the contrary the position of Point Adams, unlike Cape Disappointment, has been quite unstable. Its attached spit, the Clatsop, has also varied greatly in extent and position. Moreover, while the south channel was for a short time the best entrance, the characteristics of permanence and excellence have belonged more constantly to the northern.

These facts are mentioned as indicating the propriety of sacrificing, as some would call it, the possibility of the formation of a good south channel, to the reasonable certainty of producing and maintaining one good channel in the northern position.

A careful study of the present characteristics of the river, and of its past history, leads fairly to the conclusion that at its mouth it may be at this time approaching the condition shown on the map of Vancouver of 1792, on which a single large and deep channel is indicated, with a nearly westerly direction; and it is not improbable the river would in a few years, without the interference of man, return to that condition. This, however, is not certain; even if it were certain, the commercial and other interests involved cannot afford to wait the slow action of natural causes unassisted, and the plan of improvement submitted by the board assists these tendencies, and hastens and secures their results.

In any work of this character great care should be taken that the action of any structures placed in the river be not too violent. Otherwise, harm and not good may be done by them. The great agent to make the channel over the bar deep and maintain it, is the tide. This has an ample force and volume, but its action requires regulation and direction to the important point. The jetty intended for the improvement of the channel over the bar should be so arranged in plan and in height as not to obstruct unduly the free entry of the flood tide into the basin near the mouth of the river from which it is to ebb and do the work required of it. The artificial structure should also have such a position as to force the whole volume of the ebb towards a limited area of the bar through a single channel, and not to have it spread out and its power expended over too large a space and through several channels.

The plan proposed by the Board is based on these ideas. The structure is kept down to the level of low-water, and therefore does not materially obstruct the inflow of the flood-tide. It regulates and directs the whole volume of the ebb below the level of low-water.

The Board recommends the construction, at as early a day as possible, of a jetty, slightly convex to the north, extending from the shore near Fort Stevens in a northwesterly direction towards a point about three miles south of Cape Disappointment, this jetty to stop short of that point or be prolonged beyond it, as experience may indicate to be necessary. Its location is shown on the chart herewith of the engineer hydrography of 1881 and 1882.

It is impossible to state in advance exactly the width that the work should give to the channel at Cape Disappointment to secure deep water on the new bar outside. That the maintenance of the works may be practicable it certainly must not be too small. Three miles have been taken, which will be somewhat reduced by the continued existence, in a modified form, of Peacock Spit. A certain latitude in the amount of

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contraction is very desirable. Should that adopted be too small, it can be increased either by raising the jetty somewhat, or by a short jetty on Peacock Spit.

This jetty is expected to be mainly of stone, and the estimate is on that basis. In depths greater than about 15 feet at high-water, where it is found practicable to lay mattresses, the structure should be as follows: There should first be laid a very strongly built mattress about 3 feet thick, and upon this a layer of rubble stone 3 feet thick; then a mound of stones of large size, with a top width of not less than 5 feet, the slope on the outside to be one perpendicular on 3 base, and on the inside one perpendicular to 2 base. Where the shock of heavy seas is to be sustained, this mound should be faced with *beton* blocks of from 5 to 20 cubic yards each. The apron which forms the foundation of the mound should project in moderately smooth water 10 or 15 feet beyond its base, and 25 feet where the seas are heavy. Where mattresses cannot be placed, owing to the roughness of the water, the apron of rubble stone should be 5 feet thick. In water less than 15 feet deep at high-water the jetty should consist of a mattress 30 or 40 feet in width, covered by stone.

The jetty is intended to be brought up to the level of low-water.

It is estimated that of this jetty 5,000 linear feet may be built in water of 6 feet depth or less at low-water, 7,500 in water between 6 and 11 feet, 4,000 in water between 11 and 16 feet, 7,500 in water between 16 and 21 feet, and that the last 7,500 feet will need the facing of heavy beton blocks. The facing of this last 7,500 feet is expected to add 25 per cent. to what its cost would be if not so protected. The prices below are on a basis of $5 per cubic yard of the whole mass in place.

5,000 linear feet at $45	$225,000
7,500 linear feet at $80	600,000
4,000 linear feet at $140	560,000
7,500 linear feet at $310	2,325,000
Total	3,710,000

The position is one of very great exposure, and the allowance for contingencies should be large, probably not less than 50 per cent. If this margin be accepted, the total estimate amounts in round numbers to $5,500,000.

It should be stated, however, that while the Board considers stone to be the material which must form the great mass of the structure, we do not desire to discourage the use of wood in the shape of mattresses or pile work in the shoaler water, and indeed wherever it may be found practicable to introduce it, if economy in construction be thereby promoted. A favorable circumstance in this connection is the apparent absence, over a considerable length of the proposed work, of the sea worm, which in some other sections of the country proves so very hurtful to structures of which wood is a part, and practically prohibits its use for works of a permanent character.

The work proposed, transfers in effect the river section now existing at Chinook Point, with depths of 40 feet, to Cape Disappointment, 6 miles farther seaward. Judging from the present form of the river mouth, this will throw the sea-bar seaward of the present one, with deep water on it. If the work is built and it causes a deep channel to be cut across the sand cordon, it must yet be expected that ultimately a new sand cordon will be formed far to seaward of its end. But considering either the slight projection to be noticed in the present 100-foot curve opposite the mouth of the river, or from the small amount of sediment in the river

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as compared with great sediment-bearing rivers, such an event seems too remote to enable even a guess to be made as to its date.

In a location like the mouth of the Columbia River, where the building of any work of magnitude is certain to be one of great difficulty, it is impossible to foresee with precision the order of construction in its details, and much latitude must be left to the judgment of the local engineer in changing them and perhaps the location selected, as varying conditions may indicate or changes occur.

The cross-section upon which the estimate is made, is considered to be an approximate one which may need to be increased or decreased in places—the best that can be now devised under the circumstances and as that which may be ultimately assumed by the structure.

It is the opinion of the majority that the work proposed should be brought only to the level of low-tide. If, however, experience should demonstrate the necessity for raising the jetty to any level greater than that of low-water, it can be readily done on the lower jetty as a foundation. It should be observed, however, that the violence of the waves will be more severely felt and the difficulty of maintaining any work be increased as its height is the greater.

The Board realizes and has already called attention to the exposure of the position and the difficulty to be expected in building the jetty, especially its outer part; but it is to be observed that the head of the jetty will be partly covered by the middle sands, and be thus sheltered from the most severe wave action.

The local engineer is of the opinion that the effect of the great number of large nets used in the salmon fishing is injurious by causing a general leveling of the shoals, from contact of the heavy sinker line with the bottom, and a diminution of the current at the time when the river is in flood and charged with sediment. This opinion is shared by other persons who have been questioned, though by no means by all. While there is a coincidence between the gradual lessening of depth in the channels and a flattening of the shoals during the years from 1879 to 1882, and the commencement and increase of fishing on the bar, the other members of the Board see no evidence in the facts brought to their attention that this is more than a coincidence, or that the fishing on the bar has been a cause of shoaling of the channels to an appreciable or hurtful extent. It has been proposed to forbid by law fishing below the line connecting Chinook Point and Point Adams. It is said that such a regulation would be generally acceptable to the fishing interests as tending to prevent loss of life of fishermen on the bar and the driving of fish away from the mouth of the river. The Board, while inviting attention to this matter, does not feel called upon to recommend legislation concerning it.

In 1868 much of Clatsop Spit was out of water, and there was a south channel with 25 feet in it. It might be hoped, then, that a work which should only aim to raise Clatsop Spit above low-water would again leave the conditions of 1868 with a good south channel. The Board does not feel any confidence in such a result, nor in its permanence should it occur. Such a work would tend to throw the ebb-current towards Cape Disappointment, and in this respect would perhaps in part produce the effects expected from the jetty proposed by the Board, but in a less effective way. Should the jetty of the Board, when extended to the northern edge of Clatsop Spit, produce the depth of water in the north channel aimed at, viz, 30 feet at low-water, no engineer would think of carrying the jetty farther.

The Board has also considered the propriety of raising the jetty to mid-tide, and the opinion of the majority is that it should be kept at first

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to the level of low-water. The reasons for this conclusion are the lowing, which have been adverted to in another part of the report. work brought up to low-water will be quite effective in directing ebb-tide, while it would interfere much less with the inflow of the fl tide. The exposure to waves and the consequent difficulty and cos construction will both be considerably less if the lower height of jetty proves to be sufficient. If this height be too little, it can be creased.

It seems worthy of special remark that while there are difference opinion among the members of the Board as to the height and len to be given to the jetty starting from Point Adams, there is entire u nimity as to the necessity for such a structure. Four members of Board think the height at first need not be greater than the level of l water, but the outer end should be at a point nearly south of Cape D appointment. Lieutenant-Colonel Mendell is of the opinion that un existing circumstances it is not expedient to extend the work beyond limits of Clatsop Spit, but he would build it to the height of mid-ti or perhaps higher.

In conclusion, the Board thinks it important to state that in an u dertaking of this character, where the exposure is so great, as large portion as possible of the whole estimate should be available before t beginning of actual construction, and the work, when commenced, shou be carried forward as rapidly as practicable, with a view of attaining, the earliest day, the desired object, viz, a deep channel to the sea accommodate the great and growing commerce of which the Columb River must be the avenue, and to the growth of which the present co dition of the bar is a very formidable obstacle. When operations hav once begun, there should be no suspension of them, as in such a cas besides the loss of time, injuries to the unfinished work and unfavorabl changes in shoals and channels may be expected to such an extent a very greatly to increase the cost.

The following maps and papers are forwarded with the report:

1. Chart of mouth of Columbia River, with engineer hydrography of 1881, scal 1 : 40,000, published by the Coast Survey, showing 18-feet curves of depth on Middl Sands, May, 1882, and location of the jetty as proposed by the Board.
2. Tracing of chart of Vancouver Survey, 1792, scale 1 : 40,000.
3. Tracing of chart of Belcher Survey, 1839, scale 1 : 40,000.
4. Tracing of chart of Coast Survey, 1868, scale 1 : 40,000.
5. Description of entrance to Columbia River, as shown by different surveys.
6. Extract from description of headlands, bottom of the ocean, tides, currents, &c., prepared at United States Engineer Office, Portland, Oreg., and published in 1882 by the Portland Board of Trade.
7. Statement of direction, duration, and velocity of winds, as observed at Portland, Oreg., compiled at the office of the Chief Signal Officer, Washington, D. C., August, 1882.
8. Report of examination of bar at mouth of Columbia River, Oregon, May, 1882, by Lieut. P. M. Price.
9. Statements of commencement and increase of bar net fishing.
10. Commercial statistics from annual report of engineer in charge, 1881-'82.
11. Table of trade and commerce of Portland, Oreg., and registered tonnage crossing Columbia River Bar, published by Portland Board of Trade.

C. SEAFORTH STEWART,
Lieutenant-Colonel of Engineers.
WM. P. CRAIGHILL,
Lieutenant-Colonel of Engineers, U. S. A.
C. B. COMSTOCK,
Lieutenant-Colonel of Engineers.
CHAS. F. POWELL,
Captain of Engineers.

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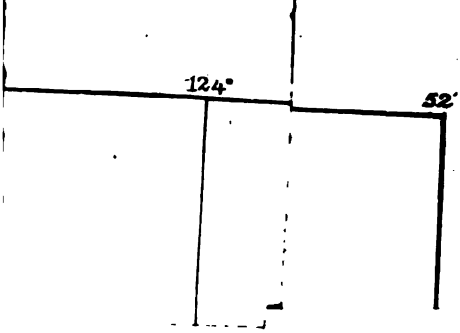

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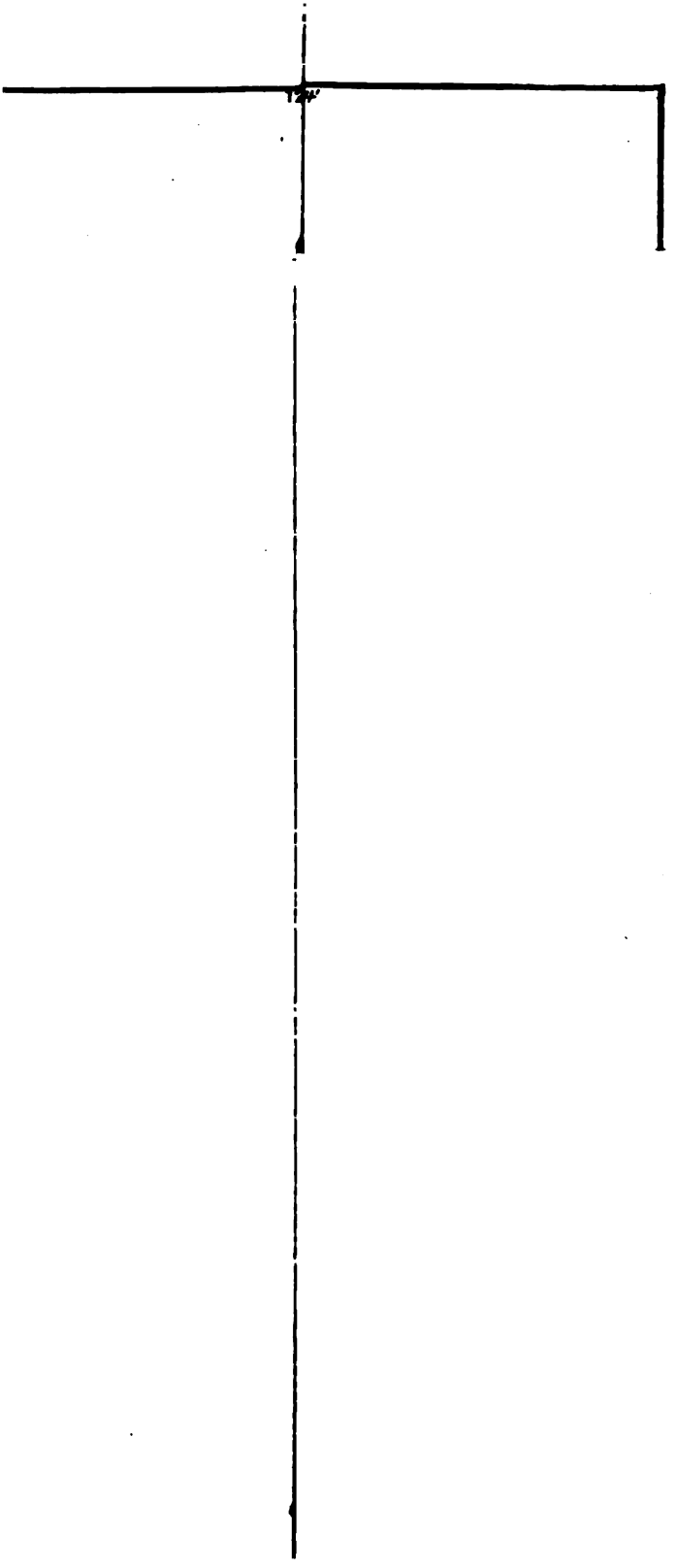

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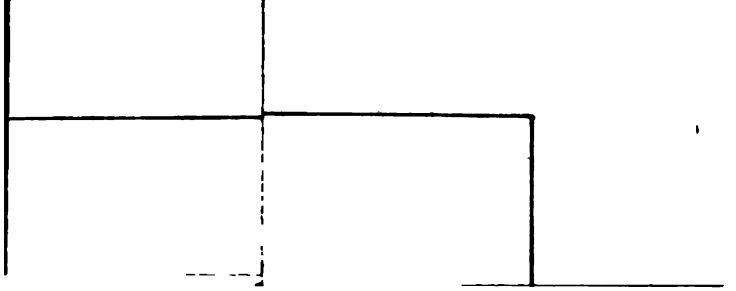

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DESCRIPTION OF THE ENTRANCE TO THE COLUMBIA RIVER, AS SHOWN BY DIFFERENT SURVEYS.

Admiral Vancouver's chart of 1792, made on a small scale and without much hydrographic detail, shows a general entrance to the river in a due eastern direction of a width of 1½ miles between the 3-fathom curves. Drawing a line from the southern point of Cape Disappointment to the northern point of the present Point Adams, and measuring from the middle of this line six statute miles due west, a depth of 27 feet is found at the most western limit of the survey, which depth can be carried, according to the chart, into the river and into Baker's Bay. No channel is shown along what is now known as Chinook Spit.

This chart, "M. C. R. 3, U. S. Engineer Office, Portland," was enlarged about eight times, to a scale of $\frac{1}{10000}$, and traced for comparison with surveys of later dates; it may be stated that perhaps not too much dependence should be placed upon the accuracy of the shore lines and 3-fathom curves. Relative distances of main points, as Cape Disappointment, Point Adams, Smith's Point (then Point George), and Point Ellice, were found to agree moderately well, however, with corresponding ones upon the first United States Coast Survey chart.

The plane of reference for soundings is not known.

This early survey indicates that there was at its time a river discharge through a single channel, the 3-fathom curve of which on the north was about three-quarters of a mile south of Cape Disappointment. In the report of the Board of Engineers, February 12, 1881, when commenting upon this survey, it is stated that "the striking feature of the existence of but one channel could not have been a matter of mistake."

Sir Edward Belcher's admiralty chart of 1839 shows a hydrographic survey of great detail. It gives the Middle Sands in the shape of a triangle, the respective angles of which are north, east, and west; the northern angle approaches Cape Disappointment to within one-half a mile; the western angle is due south of Cape Disappointment 2¼ miles, and the eastern is due north of Point Adams 1½ miles. From the east angle, and running northwest with the east side of the Middle Sands, is shown, for the first time, Sand Island, having a length of 1¼ miles.

It is around this triangular area of sands that channels lead to the river after having crossed the outer bar, which, in the main channel, is located 4½ miles from a line connecting Cape Disappointment with Point Adams.

Twenty-seven feet is the best water that can be carried over the outer bar; thence the channel passes through an opening from 5½ to 8 fathoms deep and measuring a least width of 1 mile between the 3-fathom curves. The northern edge of this channel is 2½ miles south of Cape Disappointment.

After crossing the bar from the westward, one branch of this channel turns around the southern point of the sand bank now known as Peacock Spit, runs in a northeasterly direction 3 miles to the north angle of the Middle Sands, turns about this angle to the southeastward, and runs along to the east border of the Sands 5 miles to its east corner, where it joins a straight channel, called Queen's Channel upon the chart. Queen's Channel is a second branch of the main channel. It follows along the south border of the Middle Sands in a due east direction, and has two entrances, one of them is an opening at the western angle of the Middle Sands flat, one-third of a mile wide, with channel depths of 21 feet; the other entrance is from the southward by an opening from the sea 4½ miles west of Point Adams, with a depth of 19½ feet.

The junction of the long northern channel with the shorter, or Queen's Channel, at the eastern angle of the Middle Sands, is one-half of a mile wide, showing a least available channel depth of 25 feet.

The plane of reference to which the soundings were reduced is not given; the line of low-water is drawn upon the chart, to which line the soundings diminish to zero. A high-water line is also shown. Sheet No. 2 (river sheet) gives a value for the establishment of the port, and states that the tide rises 7 feet and 6 inches. This is the height of the mean of high-waters above the mean of lower low-waters.

The chart, "M. C. R. 4, United States Engineer Office, Portland," was reduced from a scale of 4 inches to a nautical mile to a scale of $\frac{1}{10000}$, and traced for the purpose of comparing readily the conditions of the mouth of the river at times of this survey and other surveys.

Chart of Captain Wilkes' exploring expedition of 1841.—This chart shows the position of the Middle Sands; the position of the long sand bank, known as Peacock Spit, hinged to and extending 2½ miles southward from Cape Disappointment; Chinook Spit, extending in a northwesterly direction from Chinook Point; and the northern edge, 4-fathom curve, of what is known as Clatsop Spit, which line runs on a course almost due west of Point Adams.

These sand banks make two channels, viz, a direct one from the entrance south of Peacock Spit, running due east, bounded by the southern edge of the Middle Sands and the northern edge of Clatsop Spit; and a channel running northerly between

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the east edge of Peacock Spit and the west border of the Middle Sands, into Baker's Bay, turning here to a southeasterly direction, between the east border of the Middle Sands and the 3 fathom curve of the northern shore; both channels join at the east angle of the triangular middle sand bank; through their junction a depth of 4½ fathoms may be carried into the main (Astoria) channel of the river.

The outer bar gives least channel depths of 4½ fathoms at a distance of 4½ miles from the line connecting Cape Disappointment with Point Adams; beyond that distance the water rapidly deepens.

The southern (Clatsop) channel was then the more direct way into the river; depths of 27 feet could be carried through it; the distance from the bar to that part of Clatsop Channel north of Point Adams measured about 7 miles.

This map shows no entrance to the direct channel from the southward, the hydrography not having been carried below the northern 4-fathom curve of Clatsop Spit.

To what plane the soundings were reduced in this survey the chart makes no note, but as high and low water lines are given and the soundings diminish towards the latter to zero, it is judged that a low-water was the adopted plane. That a series of tidal observations were made is shown by the fact that the symbol for the establishment of the port is given upon the chart, which value, XII½, does not vary more than a few minutes from the latest determinations of the Coast Survey.

This map, "M. C. R. 5, U. S. Engineer Office, Portland," was reduced from a scale of 3 inches to a nautical mile to a scale of $\frac{1}{40000}$, and traced for ready comparisons with previous and subsequent surveys.

United States Coast Survey chart, published in 1851.*—The following extracts are made from the "Coast Pilot":

"The first examination of the Columbia River entrance by the United States Coast Survey was made in 1850. This survey shows the following changes since 1841:

"The South Sands (now called Clatsop Spit), which, in 1841, stretched 6 miles to the westward from Point Adams, had been cut through about midway between the point and their western extremity by a wide channel with deep water, running south by west from Sand Island. But the bar of this channel was not fairly opened, there being less than 3 fathoms on it. This channel was, therefore, running at right angles to that of 1841, and over the spot marked bare in 1839 (v C. F. P.).

"The north channel retained the same general features, but had moved to the southward, its southern part cutting away over a mile of the west end of the South Sands of 1841. It still had over a fathom more water than the south channel. Inside of Cape Disappointment it retained the same general direction as in 1841, but was more contracted.

"The Middle Bank (Middle Sands) was much changed, but its northern part was similar to that of previous surveys. The eastern point had moved north-northwest three-fourths of a mile since 1841. Sand Island had much increased in size, and had apparently moved with it. A long sand bank had made out from Point Adams in a northwest direction for over a mile. It was then, and is now, called Clatsop Spit.

"The western end of the great middle shoal eastward of Point Adams had been cut away three-fourths of a mile."

The bar is shown upon this chart in the north channel half way up its length to Cape Disappointment, and one mile westward of the line connecting Cape Disappointment and Point Adams, with a best depth of 27 feet.

After crossing the bar the north channel is open with good depths of water to and around the northern angle of the Middle Sands. The least water found in this passage is along the northeastern side of the Sands, where depths of 21 and 22 feet are given.

The soundings are reduced to the plane of mean low-water.

United States Coast Survey chart, published in 1854, *hydrography of* 1852.—Two distinct and separate entrances are shown to exist, one from the westward three miles south of Cape Disappointment, and the other from the southward, 3½ miles southwest of Point Adams, caused by the Middle Sands, which extend from north to south across the mouth of the river.

The outer bar is shown at the entrance of the north channel, 3 statute miles from the line connecting Cape Disappointment with Point Adams. Twenty-seven feet may be carried through the channel with good depths of water to Baker's Bay anchorage. The channel northeast of the Middle Sands from the bay to the river carries 21 feet. The latter entrance into the river is now through the south channel, where, after crossing a narrow bar with 21 feet of water upon it, a channel nearly 1 mile wide, with good depths, is open. From the entrance the channel runs 3 miles to northward, and thence eastward to deep-water of the river.

The soundings are reduced to the mean lower low-water.

This chart "M. C. R. 7, U. S. Engineer Office, Portland," scale $\frac{1}{40000}$, was traced for a ready comparison with other surveys.

* Scale of this chart and of published charts of all subsequent surveys is $\frac{1}{40000}$.

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United States Coast Survey chart, published in 1874, *hydrography of* 1868, shows a north hannel between Peacock Spit and the Middle Sands. The entrance of it is 3 miles outhwest of Cape Disappointment, where a greatest depth of 21 feet may be carried ver the bar into Baker's Bay. At the junction of this channel with the main one of he river 21 feet exist (Chinook Channel).

The south channel opens from the southward with an entrance 2 miles wide, its entral line lying 4 miles west of Point Adams. Depths not greater than 25 feet ay be carried into the deeper water of the river.

Soundings are reduced to the mean lower low-water.

United States Engineer Survey, Assistant Engineer Jessen, in 1876.—Twenty-two feet ay be carried over the outer bar of the north channel, 3 miles west of line from Disppointment to Point Adams, with good depths to Baker's Bay.

The Chinook Spit Channel bar shows best depths of from 13 to 19 feet.

The south channel has depths of 20 feet at its entrance.

The soundings are reduced to the mean lower low-water.

United States Engineer Survey, Lieutenant Payson, in 1878.—The outer bar near the entrance of the north channel, distant 3 miles from the line of Cape Disappointment and Point Adams, shows greatest depths of 23 feet, which may be carried over it to deeper water of Baker's Bay. The bar in Chinook Spit Channel has depths from 15 to 17 feet. The entrance to the river is by the south channel, which shows at its mouth a narrow opening of 20 feet depth.

The soundings are reduced to the mean lower low-water.

United States Engineer Survey, Assistant Engineer Jessen, in 1879.—The outer bar at the entrance to the north channel, is distant from the reference line heretofore taken 5 miles. Twenty-three feet can be carried over this bar into Baker's Bay.

Chinook Spit Channel is still shoaling; it was scraped during the year, but without any decided gain of depth. Its bar shows channel depths from 14 to 15 feet.

The entrance to the main river channel is by the south channel 3¼ miles due west of Point Adams. Depths of 20 feet only can be carried through this channel.

The soundings are reduced to the mean lower low-water.

United States Engineer Survey, Assistant Engineer Jessen, in 1880.—The outer bar at the entrance in the north channel is distant from the reference line 2½ miles. Depths of 21 feet may be carried over it into Baker's Bay.

The bar in Chinook Spit Channel extends along the entire eastern boarder of Sand Island; the channel depths upon it vary from 14 to 15 feet.

The Middle Sands, hinged to Sand Island, show a gradual deepening at a point 1¼ miles due south from Cape Disappointment, where a bar less than ¼ of a mile in width may be crossed with from 17 to 18 feet of water upon it. The surveys of 1878 and 1879 show this severance between Sand Island and the Middle Sands to have been gradually increasing.

The former survey shows this bar to have been a little over and the latter a little less than one-half mile in width. The narrow ridge was scraped this year with favorable result. This connection between the main channels is called the cut-off.

Nineteen feet is the best water over the bar of the south channel.

The soundings are reduced to the mean lower low water.

This chart, "M. C. R. 16, Engineer Office, Portland," was traced for a ready comparison with other surveys.

United States Engineer Survey, Lieutenant Price, in 1881.—The outer bar near the entrance to the north channel is distant 2 miles from the reference line.

Twenty feet of water is stated in the report of the survey to be the best depth which can be carried over the bar to Baker's Bay.

The severance (cut-off) between the Middle Sands and Sand Island has now the shape of a short narrow channel, 20 feet in depth, connecting the north and south channels.

The bar in Chinook Spit Channel has been filled to depths from 12 to 13 feet.

The entrance to the south channel has been gradually shoaling with formations of lumps. The depths found here are from 17 to 19 feet.

The passage to the river is now made by crossing the bar of the north channel, thence by this channel 2½ miles in a southeasterly direction to the cut-off, crossing at that point to the south channel and the deeper water of the river.

Soundings are reduced to the plane of lower low waters.

United States Engineer Examination, Lieutenant Price, in 1882.—Best depths on outer bar near mouth of north channel are 19 feet.

The cut-off shows depths of 22 feet, with a good channel of 21 feet.

The south channel has been virtually closed to deep-draught vessels by many lumpy formations at its entrance. Depths varying from 15 to 17 feet only are found here. The soundings were reduced to the plane of the lower low waters.

The minor channel across the Middle Sands about half way between the north and south channels, whose formation was first noticed in 1879, has now a depth of 17 feet on a straight line. An unsuccessful attempt was made to deepen this new channel by stiring up the bottom with large harrows.

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Locations and depths of channels at times of different surveys.

Authority of survey.	Year.	Channels over outer bar. Name.	Depth.	Distance of bar at mid-channel from middle of line connecting Cape Disappointment and present Point Adams.	Remarks.
			Feet.	*Miles.*	
Admiral Vancouver	1792	Single entrance...	27	W. 6	One channel.
Sir Edward Belcher.....	1839	Main entrance....	27	W. 5, S. 1....	Leads northeasterly through Baker's Bay. A cut-off with 21 feet at western angle of Middle Sand Bank connects with Queen's Channel.
Do.....	1839	South entrance to Queen's Channel.	19½	W. 3, S. 2 ...	Cut-off from main entrance has 21 feet. Junction of the two channels at east end of Sand Island carries 25 feet.
Captain Wilkes.....	1841	Single entrance...	27	W. 5	Divides into two channels around Middle Sand Bank. 27 feet can be carried through east junction of channels.
United States Coast Survey, 1851.	1850	North channel	27	W. 2, N. ½ ...	Around Middle Sands by Baker's Bay; 22 feet in Chinook Spit Channel.
Do.....	1850	South channel	19	W. 3½, S. 1½ ..	Channel narrow and almost closed by 16 feet shoal.
United States Coast Survey, 1854.	1852	North channel	27	W. 3, S. ½	Into Baker's Bay; 21 feet off Chinook Spit.
Do.....	1852	South channel	21	W. 1½, S. 3½ ..	The better channel to river.
United States Coast Survey, 1874.	1868	North channel	21	W. 4	Into Baker's Bay; 21 feet on bar of Chinook Spit Channel.
Do.....	1868	South channel	25	W. 2½, S. 3½ .	The better channel.
United States engineer (Jessen).	1876	North channel	22	W. 4, N. 1 ...	Into Baker's Bay; 18 feet on Chinook Spit Channel Bar.
Do.....	1876	South channel	20	W 2, S. 3 .	The better channel to river.
United States engineer (Payson).	1878	North channel	23	W. 4½, N. 1 .	Into Baker's Bay; 17 feet on bar in Chinook Spit Channel.
Do.....	1878	South channel	20	W. 2, S. 1½ ...	The better channel to deep water in river.
United States engineer (Jessen).	1879	North channel	23	W. 4, N. 1¼ ..	Into Baker's Bay, 14 to 15 feet on bar in Chinook Spit Channel.
Do.....	1879	South channel	20	W. 1¼, S. 2½ .	The better channel; 14 to 15 feet at middle of "Middle Sands"—line of Scarborough Head and Clatsop Spit—¾ mile between 18-foot curves.
Do.....	1880	North channel	21	W. 4, N. 2 ...	Into Baker's Bay, 14 to 15 feet on bar in Chinook Spit Channel; 17 feet across narrow neck of Middle Sands, next west of Sand Island. Scraped this year, with increase of 2 feet in depth.
Do.....	1880	South channel	19	W. 2, S. 2....	The better channel through to deep water in river, preceding scraping at cut-off.
United States engineer (Price).	1881	North channel	20	W. 4, N. 2 ...	20 feet in cut-off. South channel closing; average depth 18 to 19 feet, with many lumps; 12 to 13 feet in Chinook Spit Channel.
Do.....	1882	....do	19	W. 4, N. 2¼ ..	21 feet in cut-off. South channel full of lumps, with 15 to 17 feet of water on them; Chinook Spit Channel not changed. Seventeen feet at middle of Middle Sands, with ¾ mile between 18-foot curves; increase of 2 feet obtained by scraping, followed by shoaling.

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Depths in channel over sea bar, and to the river, at times of different surveys, with plane of reduction of soundings.

Year.	Over bar.	To river.	Plane of reduction of soundings.
	Feet.	*Feet.*	
1792	27	27	Not known.
1839	27	25	Probably lower low-water.
1841	27	27	A low-water.
1850	27	22	Mean low-water.
1852	27	21	Lower low-water.
1868	25	25	Do.
1876	22	20	Do.
1878	23	20	Do.
1879	23	20	Do.
1880	21	19	Do.
1881	20	20	Do.
1882	19	19	Do.

NOTE.—Mean of the two low-waters is about 1 foot above mean of the lower low-water.

EXTRACT FROM DESCRIPTION OF HEADLANDS, LIGHT-HOUSES, BUOYS, AND FOG SIGNALS; ALSO OF THE BOTTOM OF THE OCEAN, SOUNDINGS, TIDES, CURRENTS, ETC., FROM TILLAMOOK ROCK TO TOKE POINT, AND SAILING DIRECTIONS FOR APPROACHING THE MOUTH OF THE COLUMBIA RIVER.

[From the office of the United States Engineer, Portland, Oreg. Published by authority of the Portland Board of Trade, Portland, Oreg., 1882.]

HEADLANDS.

There are two prominent headlands which may be used as landmarks for making the mouth of the Columbia River, viz, Tillamook Head, on the south, and Cape Disappointment (Hancock), immediately on the north side of the mouth of the river; they are about 20 miles apart, with a low, flat shore between them.

Tillamook Head is 1,200 feet high; it presents a bold and nearly perpendicular face to the ocean, broken by extensive land slides. The top is covered with a heavy growth of spruce timber.

Cape Disappointment is a prominent headland, 3 miles long, with a general elevation of about 300 feet, disposed in a succession of round-topped hills. The sea faces of all the hills rise perpendicularly to the height of 50 or 60 feet, and then slope slightly to the crest; they are bare of trees, but are covered with grass and fern. The tops of the hills and valleys are covered with a heavy growth of spruce timber, which increases their apparent height to about 450 feet.

Cape Disappointment is remarkable for its isolation. On the south, for about 20 miles, the shore line is low, with a sandy beach; on the north the shores are also low, with a wide sandy beach, unbroken by any headland until Point Greenville, 60 miles distant, is reached.

BOTTOM OF THE OCEAN, PREVAILING WINDS, CURRENTS, SET OF THE WAVES AND TIDES.

The bottom of the ocean for 10 miles out from Tillamook Head, to Toke Point, is a smooth floor of sand, deepening on an average 5 fathoms to a mile. Off Shoalwater Bay and Columbia River, and inside 20 fathoms, the curves of depth are pushed seaward; from Point Adams the curves of less than 50 fathoms draw gradually inshore towards Tillamook Head.

The following table shows soundings, in fathoms, which should be obtained from positions as given:

Light-houses.	Bearing.	Miles.					
		3.	4.	5.	6.	8.	10.
Tillamook	E	41	43	45	48	55	63
Adams	NNE. ½ E	10	14	19	24	36	45
Disappointment	NE. by E	Var.	12	15	23	33	46
Shoalwater	NE. by E. ½ E.	5	13	21	23	29	35

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The summer winds are generally from the northwest; following the line of the coast, they gradually draw towards and over the land. Fog is their usual accompaniment.

From November to April the prevailing strong winds are southerly, with a heavy broken swell and thick, rainy, and squally weather.

The sea breaks in 2 fathoms at all times. Under southerly storms it runs in a direction normal to a line from Point Adams to Cape Disappointment, and rolling over the smooth sand bottom the waves become tremendous. In 15 to 10 fathoms they begin to have a strong set to the shore; in 8 to 10 fathoms the sea generates a power that, when applied to a ship, no anchors can withstand.

The great current of the northwest coast in its southward course passes about 60 miles off the Columbia River. It is about 50 miles wide, and has a black cold fog hanging over it, and extending beyond its limits. By the middle of June, under the influence of the regular northwest winds of summer, the great current has gained its nearest approach to the main land, receding again in winter.

An eddy current nearer shore sets northward along the coast bend between Cape Blanco and Cape Flattery. During calms this inside current is accompanied with gray fogs.

The currents on the Columbia River bar are subject to constant change, depending on the tides, channels, winds, and outflow of the river. Strong undercurrents exist. Heavy winds produce dangerous counter-currents, and the midsummer river flood causes tide-rips. There is no slackwater at the turn of the tide.

At Astoria, the corrected establishment or mean interval between the time of the moon's transit and the time of high-water is 12 hours 42 minutes. The mean rise and fall of tides is 6.1 feet, of spring-tides 7.4 feet, and of neap-tides 4.6 feet.

The two tides of the same day are generally unequal in proportion to the moon's declination.

The time and height can be obtained approximately from the following table given by the standard "Coast Pilot":

Moon's declination.	Moon's upper meridian passage.				Moon's lower meridian passage.			
	High-water.		Low-water.		High-water.		Low-water.	
	Interval.	Height.	Interval.	Height.	Interval.	Height.	Interval.	Height.
	h. m.	*Feet.*	*h. m.*	*Feet.*	*h. m.*	*Feet.*	*h. m.*	*Feet.*
Greatest north	12 4	8.1	19 39	−0.4	13 16	6.5	18 38	[illegible]
Zero	12 5	7.5	19 14	0.8	12 5	7.5	19 14	0.8
Greatest south	13 6	6.5	18 38	2.5	12 4	8.1	19 39	−0.4

The interval is to be added to the time of the moon's meridian passage to give the time of high or low water. The time of the moon's upper meridian passage is given in the almanac, and the time of its lower meridian passage is the middle between two successive upper passages. The heights are given in feet and tenths, and show the rise above the level of the average of the lowest waters, to which level the soundings on the chart are given.

Spring-tides.—At the full and change of the moon the high-waters will be 0.8 foot higher than the above, and the low-waters 0.5 foot lower.

Neap-tides.—At the moon's first and last quarters the high-water will be 0.8 foot lower, and the low-waters not fall as low by 0.5 foot.

The tide on the bars of the north and south channels makes nearly 50 minutes earlier than at Astoria.

ENTRANCE TO THE COLUMBIA RIVER.

The distance from Cape Disappointment to Point Adams is 6 miles; this is virtually the width of the entrance. On the latter point is pivoted a broad sand called Clatsop Spit. It remains about 2½ miles long, but slowly moves back and forth in a direction from northwest to west.

Peacock Spit is hinged on Cape Disappointment, and stretches out between south and southwest.

Eastward of the middle of the line joining the two capes lies the movable Sand Island. A third submerged bank, called Middle Sands, curves southwest from Sand Island, or joins the two spits in a cresent shape. There are generally, if not always,

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two channels over the outer bar, the north channel around the end of Peacock Spit, and a south channel following up the west side of Clatsop Spit and around its end. The channels may pass on opposite sides of Sand Island or unite at its westward end. Both channels are kept plainly buoyed. They are subject to constant changes, and there is no certainty of exact sailing directions holding good from one season to the next. At present the north is the ship channel. A third unsurveyed channel exists midway between the north and south. The natural depths vary in different years from 17 to 24 feet at mean low-tide, according to the equality of all the channels or the predominance of one.

Baker's Bay, inside of Cape Disappointment, affords good anchorage.

* * * * * * *

STATEMENT SHOWING THE NUMBER OF TIMES THE WIND WAS OBSERVED TO BLOW FROM THE EIGHT PRINCIPAL POINTS OF THE COMPASS AT PORTLAND, OREG., FOR EACH MONTH FROM JANUARY, 1877, TO DECEMBER, 1881, COMPILED FROM THE THREE TELEGRAPHIC OBSERVATIONS; ALSO THE MAXIMUM VELOCITIES OF THE WIND, IN MILES, WITH THE DIRECTIONS FROM WHICH THE SAME WERE OBSERVED TO BLOW DURING THE SAME PERIOD.

[Compiled from the records on file at the office of the Chief Signal Officer, Washington, D. C.]

WAR DEPARTMENT,
OFFICE OF CHIEF SIGNAL OFFICER,
Washington, D. C., August 31, 1882.

Number of times the wind was observed blowing from the eight principal points of the compass.

[Compiled from the three telegraphic observations.]

PORTLAND, OREG.

1877.

Point.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
N	19	14	10	24	20	14	31	23	19	20	9	15
NE	5	4	3	3	2	3	7	2	4	2	1	2
E	16	7	5	2	3	5	3	3	2	5	4	20
SE	15	1	7	3	3	8	3	3	4	2	4	7
S	20	24	31	15	20	4	23	25	32	18	30	24
SW	0	5	10	5	7	3	5	8	11	7	12	5
W	5	2	2	2	3	5	3	3	3	5	3	2
NW	8	7	10	15	14	34	14	21	12	6	2	9

1878.

N	7	5	10	5	7	12	5	6	6	8	13	12
NE	9	2	2	2	3	2	2	3	6	6	0	20
E	18	10	7	2	2	3	2	4	1	1	2	9
SE	20	24	16	17	17	9	6	7	5	12	6	8
S	23	26	24	10	14	4	6	5	17	27	47	11
SW	5	1	5	5	5	2	5	4	7	5	6	8
W	2	1	6	12	9	5	4	5	5	7	7	1
NW	4	10	18	30	34	47	54	48	30	24	10	23

1879.

N	6	8	5	13	9	17	18	11	13	8	8	7
NE	7	4	5	2	2	2	0	2	2	3	4	7
E	7	5	6	2	2	3	1	2	1	7	4	9
SE	8	12	9	14	10	9	5	7	6	11	13	12
S	38	35	42	23	38	9	17	13	21	30	22	40
SW	7	9	7	7	9	3	2	5	7	11	12	7
W	2	1	3	4	3	3	4	1	2	3	2	1
NW	16	8	14	22	16	41	38	42	26	17	10	6

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PORTLAND, OREG.—Cont'd.

1880.

Point.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
N	6	5	4	6	4	5	7	14	15	3	15	13
NE	2	1	4	4	0	0	1	0	3	0	11	3
E	0	1	3	5	3	2	1	0	2	1	5	25
SE	7	13	4	7	8	10	4	3	8	3	3	15
S	47	28	34	21	23	15	7	12	10	19	10	15
SW	13	10	10	5	13	6	6	3	3	8	5	1
W	2	5	5	1	10	8	7	4	4	4	10	6
NW	11	21	15	20	25	41	54	51	31	35	20	5

1881.

N	7	1	2	8	8	6	20	22	10	7	5	4
NE	11	3	0	1	2	1	0	2	0	2	1	3
E	19	10	7	5	2	4	4	0	0	5	4	8
SE	11	13	7	9	5	10	7	1	6	6	8	7
S	15	39	30	24	15	17	13	12	15	33	28	35
SW	5	6	9	8	9	11	7	4	9	7	7	5
W	4	1	4	9	5	1	4	6	6	6	13	4
NW	18	9	21	20	44	32	28	34	31	16	0	6

1882.

N	3	4	5	4	8	5
NE	4	3	4	7	7	1
E	7	7	0	5	4	0
SE	7	6	4	8	8	3
S	32	35	33	23	15	16
SW	8	5	10	10	6	7
W	5	2	7	2	3	4
NW	6	9	12	14	24	40

Statement showing the maximum velocities of the wind, in miles per hour, with the direction from which the same was observed to blow.

PORTLAND, OREG.

Year.	January.	February.	March.	April.	May.	June.
1877	20 S.	16 E.	28 S.	16 N.	16 N.	20 NW.
1878	32 SE.	28 S.	36 S.	24 NW.	20 NW.	20 NW.
1879	21 S.	24 SW.	39 S.	22 S.	22 S.	21 NW.
1880	53 S.	28 S.	32 S.	26 S.	35 S.	19 NW.
1881	34 S.	24 E.	25 S.	24 S.	22 NE. / 22 NW.	20 SE.
1882	24 S. / 24 SW.	28 S.	24 NE.	30 SE.	24 S.	30 SE.

Year.	July.	August.	September.	October.	November.	December.
1877	24 SW.	28 S.	20 S.	20 S.	24 S.	20 E.
1878	20 NW.	24 NW.	24 S.	24 S.	28 S.	23 S.
1879	22 W.	15 S. / 15 N.	24 S.	26 S.	25 S.	29 S.
1880	16 NW.	16 NW.	20 E.	20 SW.	33 S.	21 S.
1881	22 S.	16 S.	22 S.	19 S.	26 S.	30 S.
1882	18 SW.					

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REPORT OF EXAMINATION OF BAR, MOUTH OF COLUMBIA RIVER, BY LIEUT. P. M. PRICE, CORPS OF ENGINEERS.

ASTORIA, OREG., *May* 31, 1882.

SIR: I have the honor to submit the following report of an examination of the bar at the mouth of the Columbia River, with a view to the selection of a suitable channel for scraping, made on May 23 and 24, 1882, in accordance with your letter of instructions dated May 20, 1882.

The examination was made with the bar tug Astoria, whose position at short intervals, generally two minutes, was determined by theodolite readings at the two shore stations on Cape Hancock and Fort Stevens, used during my survey of May and June, 1881. The methods were in every respect the same as used on that survey, described in my report of July 13, 1881.

A comparison of this examination with the survey of 1881 shows that Clatsop Spit has changed but little, if any, in position or extent. The southern side of Sand Island has about the same position, but the northern point has made out considerably further into Baker's Bay. The "cut-off" channel between the old south channel and the north channel has widened and deepened, and shows a least depth at mean low-water of 21 feet. The Middle Sands have made to the northward throwing the north channel to the north, and Peacock Spit has made to the eastward. The north channel shows a least depth of 19 feet at mean low-water. The south channel is about the same as last year, full of lumps, with 15 to 17 feet of water on them.

A thorough examination was made of that part of the Middle Sands between the north and south channels where the survey of last year indicated that there was a disposition for the ebb currents to break through and open a new and straight channel. The cutting out at this locality has continued, and now there is a straight channel over the sands with a least depth of 17 feet. The distance between the 18-foot curves in passing through this channel is one-quarter of a mile, and between the 24-foot curves is 1¼ miles. There is one lump with a least depth of 17 feet, one-quarter of a mile to the eastward, and detached from the general 17-foot shoal.

The tug was allowed to drift from the deep water off Clatsop Spit buoy when the tide was about half ebb, and the result shows that ebb currents set directly through this channel and with great force. The bottom is hard sand. It was therefore selected as the proper place to scrape, and on the 28th of May three buoys were placed by the Shubrick, the light-house tender, as guides for the scraping. Two of these buoys are on the north side of the channel, 3¾ miles magnetic south of Cape Hancock, and one on the south side of the channel selected, the width between them being three-fourths of a mile.

The scraper is the one used on the "cut-off" in 1880. It is now ready, a tug engaged, and scraping will be commenced on the first suitable day.

In closing this report I desire to call your attention to the injurious effect, in my opinion, of the fishing upon the bar. The fishing season is fixed by law from the 1st of April to the 31st of July. The nets used are about 300 fathoms in length and 30 feet in width.

Formerly the fishing was confined to the river proper, but during the past three or four years the fishing has gradually extended further down, until during the past two seasons, as well as this season, many boats have fished out upon the bar itself. On the 24th of May I counted thirty-one boats on the Middle Sands and in the south channel.

The surveys of the last three years show that the sands have flattened out, and now cover a much greater area than formerly, have deepened, and that the channels have shoaled until they are almost obliterated. It would certainly seem that this effect is directly due to these immense nets drifting backwards and forwards on the sands during the season when the currents are the strongest by reason of the high water in the Columbia. I do not think that natural causes, or these combined with artificial means, such as scraping, or the water-jet, or blasting, will ever be able to open out and maintain a good channel over the bar as long as the fishermen are permitted to drag their nets over it and stir up the sand as they now do.

Very respectfully,

PHILIP M. PRICE,
First Lieutenant of Engineers.

Capt. CHAS. F. POWELL,
Corps of Engineers.

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COMMENCEMENT AND INCREASE OF BAR NET FISHING.

LETTER FROM ASTORIA CHAMBER OF COMMERCE GIVING HISTORY OF BAR FISHING.

ASTORIA, OREG., *September* 6, 1882.

SIR: In answer to your inquiry of last month, the chamber of commerce directs the following statement:

"That prior to 1879 but very little fishing was done below Sand Island. That during the season of that year several boats fished there, and with such success that in 1880 a cannery at Ilwaco was built and run, employing about thirty boats. One or two stations were also established in Baker's Bay.

"There were perhaps fifty boats that year which went on to the bar to fish.

"In 1881 two stations were placed on Sand Island, and one or two on the military grounds at Fort Hancock, with the permission of the military authorities.

"About the same time stations for up-river canneries were located in the Skippanon. One cannery had previously been located in Tansy Creek.

"Several hundred boats fished about Sand Island in 1881, in north and south channels.

"During the season of 1882, just closed (it has been estimated) seven hundred boats fished below Smith's Point and Scarborough Hill, the most of which went below Sand Island, more or less, often drifting directly to sea.

"Favorite sweeps with the brave and reckless were through the breakers on Clatsop Spit and between the channels below Sand Island.

"Nets now used are each 250 to 350 fathoms in length and 3 to 4 fathoms deep. The bottom of the net is hung with a three-eighths inch cotton line, weighted with lead.

"The Great Republic and Dilharrie wrecks catch and destroy many nets."

I have the honor to remain, very respectfully, yours,

J. Q. A. BOWLBY,
President Astoria Chamber of Commerce.

CHAS. F. POWELL,
Captain of Engineers.

STATEMENTS OF MESSRS. YOUNG AND TAYLOR ON INTRODUCTION AND INCREASE OF USE OF BAR FISHING BOATS.

"In the fall of 1876, proprietors of Kinney's cannery built about fifty boats of larger size and better model than previously used on the river, for fishing on the bar.

"They used about one hundred to one hundred and ten boats during the following (1877) season. Other cannery men followed suit with bar boats in 1878.

"By 1880, and especially in 1881, small, light river boats could not be rented.

"Eighteen hundred and seventy-seven was first year of bar fishing to any extent."

The above statements were made by Mr. James Young, in charge of Kinney's cannery, in 1876 and 1877, and by Mr. George Taylor, jr., who was in charge in 1878, '79, '80.

C. F. P.

COMMERCIAL STATISTICS FROM ANNUAL REPORT OF ENGINEER IN CHARGE, 1881–1882.

The Lower Willamette and Columbia rivers are in collection districts of Willamette and Oregon. The nearest ports of entry are Portland and Astoria, Oreg. The nearest light-houses and works of defense are at the entrance to the Columbia River. The revenue collected for the year ending May 31, 1882, at Portland was $332,664.65, and at Astoria, $62,705.

The following refer to the district of Oregon for year ending May 31, 1882, and are furnished by Mr. C. Brown, deputy collector:

Value of imports	$221,188
Value of exports	$3,803,894
Coastwise arrivals—number, 245; registered tonnage	464,275
Coastwise clearances—number, 215; registered tonnage	431,482
Foreign arrivals—number, 33; tons of cargo or ballast	29,884
Foreign clearances—number, 131; tons of cargo or ballast	130,629

The following refer to the district of Willamette for year ending May 31, 1882, and are furnished by Mr. F. N. Shurtleff, collector:

Value of imports	$558,001
Value of exports	$6,614,243
Coastwise arrivals—number, 161; registered tonnage	272,619
Coastwise clearances—number, 124; registered tonnage	240,580
Foreign arrivals—number, 131; tons of cargo or ballast	118,818
Foreign clearances—number, 168; tons of cargo or ballast	154,408

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The above statements show in excess of the actual number of arrivals and departures between the Willamette or Columbia River and the sea, since a vessel discharging or receiving part cargo at Astoria and remainder at Portland, as several vessels are known to have done, is entered as an arrival or clearance at both ports. Taking money values for a comparison of foreign commerce of the year with that of the preceding one, it is found that the revenues have decreased 11 per cent., the imports increased 12 per cent., and the exports increased nearly 200 per cent.

The principal industry on the Lower Columbia is salmon fishing and canning; Astoria is the point of distribution of the product, which goes mostly to foreign markets. In 1866 the pack was 4,000 cases; in 1881 it was 550,000 cases, at $5 a case; and in the present year it is estimated as 525,000 cases at $5.20.

The following table of the Portland wheat fleets was compiled from the files of the Portland Journal of Commerce:

Month.	1875–'76.		1876–'77.		1877–'78.		1878–'79.		1879–'80.		1880–'81.		1881–'82		Monthly means.		
	Arrived.	Cleared.	Arrived.	Cleared.	Arrived.	Cleared.	Arrived.	Cleared.	Arrived.	Cleared.	Arrived.	Cleared.	Arrived.	Cleared.	Arrived.	Cleared.	Both.
July	....	....	....	....	1	..	1	2	4	....	2	....	9	8	3.4	2.0	5.4
August	....	....	....	1	2	1	6	1	6	1	6	1	9	10	5.8	2.5	8.3
September	....	4	....	4	16	5	11	1	9	3	7	2	19	12	12.4	4.4	16.8
October	....	9	....	14	29	20	18	11	16	15	4	6	31	19	19.8	13.4	33.2
November	....	8	....	12	11	22	12	14	11	14	6	9	17	21	11.4	14.3	25.7
December	....	8	....	14	5	15	6	10	10	15	7	10	18	26	9.2	14.0	23.2
January	....	9	....	13	4	3	1	12	8	10	8	6	18	21	7.8	10.6	18.4
February	....	6	....	1	2	3	1	4	5	9	2	7	12	17	4.4	6.7	11.1
March	....	6	....	2	1	2	....	4	6	7	4	5	9	11	4.0	5.3	9.3
April	....	5	....	1	1	2	..	2	3	6	12	5	6	9	4.4	4.3	8.7
May	....	2	....	....	1	1	....	1	....	1	16	3	2	4	3.4	3.1	6.5
June	....	2	....	....	4	..	....	5	1	1	5	7	5	6	3.8	3.0	6.8
Total	....	59	....	62	77	74	56	67	79	82	79	71	155	164	89.8	83.6	173.4

TRADE AND COMMERCE OF PORTLAND, OREG.

[Published by Portland Board of Trade.]

Total exports during twelve months ending July 31, 1882.

Articles.	Domestic.		Foreign.		Total.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Wheat ..... centals..	437, 897	$711, 900	3, 704, 922	$5, 965, 518	4, 142, 819	$6, 667, 418
Flour ..... barrels..	95, 956	443, 612	526, 003	2, 410, 180	621, 959	2, 853, 792
Salmon ..... cases..	192, 501	927, 597	388, 427	1, 557, 164	501, 325	2, 484, 061
Wool ..... pounds..	7, 436, 772	1, 488, 360	.....	.....	7, 436, 772	1, 488, 360
Woolen goods	.....	546, 125	.....	.....	.....	546, 125
Oats ..... centals..	313, 869	417, 749	.....	.....	313, 869	417, 749
Potatoes ..... sacks..	256, 527	278, 057	1, 110	1, 196	257, 637	279, 253
Lumber, feet (lumber, lath, and piling).	.....	206, 601	2, 614, 920	21, 791	.....	228, 392
Flaxseed ..... sacks..	63, 324	184, 905	.....	.....	63, 324	184, 905
Hides ..... pounds..	1, 318, 500	136, 120	1, 500	150	1, 320, 000	136, 270
Dried fruit ..... packages..	14, 488	105, 184	881	2, 650	15, 369	107, 834
Hops ..... pounds..	518, 600	84, 626	.....	.....	518, 600	84, 626
Pig iron ..... tons..	2, 368	73, 408	.....	.....	2, 368	73, 408
Millstuffs ..... sacks..	82, 192	56, 951	5, 316	10, 444	87, 508	67, 395
Barrel stock	.....	50, 000	.....	.....	.....	50, 000
Barley ..... centals..	20, 334	45, 527	413	742	20, 747	46, 269
Bacon ..... pounds..	173, 600	24, 587	1, 200	180	174, 200	24, 767
Butter ..... do	116, 790	24, 654	.....	.....	116, 790	24, 654
Eggs ..... dozen..	103, 500	20, 628	250	50	103, 750	20, 678
Leather ..... pounds..	123, 380	18, 447	.....	.....	123, 380	18, 447
Green fruit ..... boxes..	18, 801	17, 873	10	15	18, 811	17, 888
Tallow ..... pounds..	214, 604	14, 909	.....	.....	214, 604	14, 909
Canned goods ..... cases..	3, 043	9, 032	.....	.....	3, 043	9, 032
Hams ..... pounds..	27, 300	3, 078	600	90	27, 900	3, 168
Lard ..... do....	8, 100	1, 115	.....	.....	8, 100	1, 115
*All other articles ..... packages..	.....	8, 693	40	240	.....	8, 933
Total value	....	5, 899, 738	.....	9, 970, 410	.....	15, 870, 148

*Corn, $644; onions, $903; pork, $1,116; beef, $6,030 = $8,693.

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Registered tonnage, crossed out over Columbia River Bar, during twelve months ending J
31, 1882.

Months	SAILING VESSELS. American. No.	American. Tonnage.	British. No.	British. Tonnage.	Norwegian. No.	Norwegian. Tonnage.	French. No.	French. Ton- nage.
1881.								
August	3	4,050	8	6,396				
September	3	3,460	9	8,334				
October	1	1,249	14	11,197			1	
November	5	5,690	20	17,894				
December	3	2,868	16	15,284				
1882.								
January	5	6,106	17	14,638			1	
February			16	15,036	2	1,461		
March	3	3,737	12	10,909	1	656		
April	1	1,135	6	6,637				
May	5	5,658	2	1,651			1	
June	2	2,718	4	3,519				
July	1	1,216	1	699				
	32	37,887	125	112,194	3	2,117	3	

Months.	STEAMERS. American. No.	American. Ton- nage.	British. No.	British. Ton- nage.	COASTERS. American. No.	American. Ton- nage.	Totals. No.	Ton- nage.
1881.								
August	8	17,403			3	770	22	
September	9	15,791			7	2,756	28	
October	11	21,926			1	376	28	
November	12	23,833			5	2,211	42	
December	10	17,790			3	1,048	32	
1882.								
January	11	17,899			6	1,757	40	
February	9	16,549			3	884	30	
March	11	20,100			4	1,512	31	
April	15	27,365			4	1,625	26	
May	12	22,873			2	894	22	
June	11	24,805	3	3,803	6	2,503	26	
July	9	19,133	1	1,513	7	1,805	19	
	128	244,967	4	5,317	51	18,231	346	

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Registered tonnage over Columbia River Bar, "inward bound," for year ending July 31, 1882.

Months.	SAILING VESSELS.*							
	American.		British.		Norwegian.		French.	
	No.	Tonnage.	No.	Tonnage.	No.	Tonnage.	No.	Tonnage.
1881.								
August	1	1,359	9	8,361				
September	2	2,630	15	11,550			1	649
October	4	5,118	29	27,656				
November	5	5,231	11	9,174				
December			14	1,261			1	384
1882.								
January	3	3,737	23	20,893	2	1,461		
February	2	2,485	8	7,551	1	656		
March	3	3,726	7	6,678				
April	2	2,030	4	3,519			1	560
May	5	5,068	2	1,265				
June	2	2,589	3	3,578				
July	1	997	3	2,651				
Totals	30	34,970	128	104,137	3	2,117	3	1,593

Months.	STEAMERS.				COASTERS.		Totals.	
	American.		British.		American.			
	No.	Tonnage.	No.	Tonnage.	No.	Tonnage.	No.	Tonnage.
1881.								
August	12	24,102			6	2,255	28	36,077
September	9	17,349			3	1,167	30	33,345
October	12	20,594			5	1,981	50	55,349
November	10	21,069			6	1,343	32	36,817
December	8	14,808			3	1,284	26	17,737
1882.								
January	11	19,666			3	1,309	42	47,066
February	10	16,355			3	1,185	24	28,232
March	12	17,349			4	1,529	26	29,282
April	13	26,362	1	1,337	5	2,153	26	35,961
May	13	18,799	2	2,548	4	1,483	26	29,163
June	15	25,175	1	1,256	6	1,571	28	35,651
July	11	22,253	1	1,513	4	1,306	20	28,720
Totals	136	243,881	5	6,654	52	18,566	358	413,410

German, 1; tonnage, 1,492.

MINORITY REPORT.

UNITED STATES ENGINEER OFFICE,
San Francisco, October 17, 1882.

GENERAL: A difference of opinion on some important points relating to the improvement of the Columbia River entrance leads me to express my views separately.

The peculiar circumstances of heavy sea waves, strong and alternating currents, and the prevalence of sand in the vicinity, in unstable positions, introduce obstacles of so serious a nature that they may be said to place limitations upon the application of principles at the Columbia River.

An application of principles successful at the Danube or at the Mis-

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sissippi, where these obstacles do not exist, may require modification to become practicable at the Columbia.

A work extended seaward from Point Adams to a point 2 or 3 miles south of Cape Disappointment must cross a deep channel of the river over a mile in width, with an unstable bed, which at times in each day carries several hundred thousand cubic feet of water per second.

An encroachment upon the sectional area of a channel of this character, in which water moves with considerable velocities, is likely to develop an equal compensation by scouring the bed, so that the operation of closing becomes one of delicacy and difficulty, even when both banks can be occupied and stored with material in the most convenient positions. Where the channel is several miles from shore, with limited communication with the shore and exposed to waves which disturb the bottom to considerable depth, the obstacles to success are much increased. This combination of circumstances affects the construction of such a work with a considerable degree of uncertainty.

The changes in phases of the river entrance, while not so sudden as those which affect the bars of smaller harbors on the sandy coast, do yet occur within periods shorter than that required to complete a work such as has been alluded to. It is therefore quite possible that such a work might be overtaken during its construction by one of these changes which would not only forbid its further prosecution, but involve the loss of a part already well advanced to completion.

These considerations seem to me to be entitled to govern in a great degree the protection of a work at the mouth of the Columbia River. They suggest that the formidable difficulties to be met in deep water should be avoided until a plain necessity compels us to encounter them. Such a necessity can hardly be said to be demonstrated until all the advantages that can be realized from the occupation of Clatsop Spit shall be developed and found to be insufficient to effect the desired result. These advantages cannot be developed until the spit is occupied by a work raised to a higher level than that of low tide.

The two points here sketched, namely, the extension of the jetty to deep water, and its height, are those in which I am not able to agree with the Board.

These remarks lead to inquiry as to the extent and character of improvement possible, which shall not be exposed to the great contingencies of cost and disaster, threatening a structure such as has been mentioned.

The decaying influence of Sand Island in dividing the waters of the river at its point of departure for the sea leaves the river in a more favorable condition for works of improvement than in this respect has been the case for many years. This injurious influence, now not large, is constantly diminishing. The river may soon be a unit between Point Adams and Sand Island. In 1868 the river was divided by the island into two large and not very unequal parts. One of these fractions maintained for itself for some years a channel over the bar 2 miles wide, with depths of 25 to 27 feet.

The controlling natural feature which seemed to be entitled to the credit of this great result was Clatsop Spit, which, for more than 2 miles of its length, stood 2 or 3 feet above low water. It now lies 4 or 5 feet below low-water, 6 or 8 feet below its level in 1868.

It is practicable to restore and magnify this condition of Clatsop Spit by a work which shall present no unusual difficulties of construction, which shall be subjected to a minimum of exposure, one which is practicable at a moderate cost, and capable of being built in three years.

It may be remarked that it is not to be expected that the restoration

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of Clatsop Spit will reproduce the channel in the position of 1868. The direction of Clatsop Spit and the unity of the river point to the development of a channel well to the north, approaching in position that of 1792.

If it were desirable to re-establish the position of 1868, it would be necessary to build works other than here proposed, if indeed the project could be considered to be practicable.

To concentrate the river within moderate width, and to discharge it as a unit to the sea, are the objects sought.

This condition attained gives the best assurance of good results.

The most favorable position for a work which shall fulfill these conditions appears to be a line on the north side of Clatsop Spit and about parallel to the crest.

This line is now assumed to conform to the 8-foot contour of depth, in the expectation that this depth will afford a fair degree of accessibility, on the flood-tide, to vessels discharging stone, thereby promoting cheapness.

But for this consideration the line would be better located nearer the crest of the Spit. It is possible that a depth less than 8 feet may be found sufficient. If this be the case, the estimate of cost herein given, based on a depth of 8 feet, will be reduced.

The line, as nearly as it can be projected on the latest map, is 14,000 feet in length. It starts from the westerly side of Point Adams, and ends at a point near the end of the Spit, 3 miles distant from the cape, and about 2 miles to the eastward and one-half mile northward of the end of the work projected by the Board.

The object to be secured by this work, which is merely the practical elevation of Clatsop Spit, permits enough latitude in its location to take in all the natural advantages of the position. This line is to be occupied by a work built to the level of mid-tide, being raised along its whole length to low-water, or nearly to low-water, before any large portion of it is built higher.

The line projected by the Board occupied in the same way over the portion of its length lying on Clatsop Spit, would be productive of the same or similar results, at some additional cost.

Projecting this work as 12 feet high, which is 4 feet above low-water, 20 feet wide on top, and with slopes of 1 and 3 base respectively, its contents become 275,000 cubic yards.

Placing stone at $4 per cubic yard, the estimate becomes $1,100,000; adding 25 per cent. for contingencies, it is $1,375,000.

By the circumstances of its location, under the shelter of the crest of the spit lying to the southward, the dimensions assumed are thought to be entirely reasonable, and perhaps in excess of those that will be required. The same circumstances permit the use of small materials and are thought to dispense with the necessity for unusual sizes, and this, together with the accessibility of the line to barges, makes the estimate of $4 per yard reasonable, and not likely to be exceeded. The estimate is believed to be full.

Assuming the average depth at low-water over Clatsop Spit to be 5 feet, and adding the height of the work, 4 feet, it will be seen that the sectional area of the waste-weir, through which the ebb-tide now escapes, and which will be closed by the proposed work, is 126,000 square feet, being a channel 14,000 feet long and 9 feet average depth.

The mid-tide cross-section of the river between Point Adams and Chinook Point is 500,000 square feet. Through this section the whole ebb, estimated at an average of 1,000,000 cubic feet per second, passes.

The contraction secured is therefore one-fourth of the river section at Point Adams.

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The quantity of water thus to be diverted into the main river channel is hardly a matter of calculation under the present circumstances of our knowledge, nor can its effect on the improvement of the bar channels be accurately demonstrated.

It may, however, be claimed that this project affords a real concentration of the river in as great a degree as now appears to be practicable at a moderate cost, and further, that the history of the river justifies hope that a great improvement in depth will thereby be secured. The conditions under which 4 fathoms and more existed in the past do not seem to me so favorable for good depth as those that will be established by this work.

The line is sheltered as far as possible by the spit to the southward: it is accessible, it presents no unusual difficulties, its cost is moderate, it can be built in three years, it is in a position to receive aid from the action of the flood-tide and waves which transport sand over Clatsop Spit, and lastly, its construction must reinforce the river by a material increment.

The estimate is based upon the use of stone, but wood in mattresses and perhaps in other forms may be used with advantage.

If this work were completed, it might at some subsequent time be a question whether it ought or ought not to be raised above the high-water level.

If, as anticipated, Clatsop Spit shall form to the height of the work, it will be comparatively inexpensive to raise the line 4 or 5 feet higher.

It would seem as tending still more towards unity in the river, that further elevation in the line would be beneficial. It has been suggested that the elevation of a jetty to mid-tide level may interfere with the entrance of the flood-tide. This might be the case if the bottom were unyielding. The history of the river and common observations show the bed of the entrance to be very unstable. Beds of this character usually adapt themselves with great facility to changes of width.

The construction of a work of the kind proposed is gradual. It makes, day by day, no violent changes in sections. The ebb-tide has plenty of time to adapt itself to new conditions. In confirmation of these remarks it may be said that in 1868, when Clatsop Spit was above low-water and the Middle Sands and Peacock Spit were shoaler than now, it was not found that the ingress of the flood-tide was impeded. The fact that the channel then existing was one of the best the river ever had, would seem to indicate that the flood supplied all the water that was needed.

Now that the river section is much enlarged by the deepening on the shoals, it is not claimed that the flood-tide supplies more water than it did in 1868.

San Francisco Harbor enters and discharges its 3,000,000 cubic feet of average tide per second through an entrance of barely 1 mile in width.

Analogy indicates that the opening of 3 miles is sufficient to permit the entrance of 1,000,000 feet into the Columbia.

The real concern of a project appears to be to concentrate the ebb to get its maximum effect. If this be successfully done, the flood may be trusted to do its part.

I am, very respectfully, your obedient servant,

G. H. MENDELL,
Lieutenant-Colonel, Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. A.

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LETTER

FROM

THE ATTORNEY GENERAL,

TRANSMITTING

A copy of a letter of the 8th instant, from the board of trustees of the Reform School, District of Columbia, with an estimate for necessary buildings, &c.

DECEMBER 12, 1882.—Referred to the Committee on the District of Columbia and ordered to be printed.

DEPARTMENT OF JUSTICE,
Washington, December 11, 1882.

SIR: I have the honor to inclose herewith a copy of a letter of the 8th instant, addressed to me by the president of the board of trustees of the Reform School, District of Columbia, together with an estimate of amounts necessary to erect suitable buildings which are greatly needed by the school.

I approve of the request made by the president of the board of trustees, and beg to direct the attention of Congress to the urgency of this matter.

Very respectfully,

BREWSTER,
Attorney-General.

The PRESIDENT OF THE SENATE.

REFORM SCHOOL OF THE DISTRICT OF COLUMBIA,
Washington, December 8, 1882.

SIR: I have the honor to submit herewith estimates of amounts necessary to erect an addition to our family building, a barn, an out-building for farm purposes, and a chapel structure.

As indicated in my annual report to you and in the papers therewith submitted (to which for brevity I respectfully refer you), the school suffers very much from the want of the accommodations that will be afforded by these buildings, and I beg that you will at as early a day as possible cause them to be transmitted to Congress, supplemented with your earnest approval.

Very respectfully, your obedient servant,

RICHARD JOSEPH,
President Board of Trustees.

Hon. BENJAMIN H. BREWSTER,
Attorney-General of the United States.

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Estimates of appropriations required for the service of the fiscal year ending June 30, 1884, by the Reform School of the District of Columbia.

IMPROVEMENTS.

Addition to family building, three stories, brick, stone foundation and trimmings, fitted for steam-heating, gas, &c., complete (submitted)...	$12,500 00

NOTE.—The present buildings, two in number, are overcrowded, and the school is unable to provide for those now committed. It is desired to separate the younger from the older inmates, and, with the additional room thus afforded, the capacity of the school will be increased at least one-fourth. (The annual report board of trustees.)

One new barn, stone basement and frame superstructure (submitted)....	7,500 00
One out-building for farm purposes, with cellars for root-crops (submitted)	750 00
One building for chapel, stone foundation with frame superstructure (submitted).....	3,000 00
Total.....	23,250 00

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47TH CONGRESS, 2d Session. | SENATE. | Ex. Doc. No. 15.

MESSAGE

FROM THE

PRESIDENT OF THE UNITED STATES,

TRANSMITTING

A letter from the Secretary of the Interior inclosing a letter from the acting governor of New Mexico, relating to the necessity for holding a session of the Territorial legislature of New Mexico in January, 1883.

DECEMBER 15, 1882.—Read and referred to the Committee on Territories and ordered to be printed.

The Senate and House of Representatives:

I transmit herewith, for the consideration of Congress, a letter from the Secretary of the Interior inclosing a copy of a letter from the acting governor of New Mexico, in which he sets forth reasons why authority should be given and provision made for holding a session of the Territorial legislature of New Mexico in January, 1883, or soon thereafter.

CHESTER A. ARTHUR.

EXECUTIVE MANSION,
December 15, 1882.

DEPARTMENT OF THE INTERIOR,
Washington, December 13, 1882.

SIR: I have the honor to inclose herewith copy of a communication from the acting governor of the Territory of New Mexico, in which he states that the Territorial legislature which convened in January, 1882, provided by law that the legislature should hold a session in January, 1883, and thereafter every two years.

Section 1846 of the Revised Statutes provides that the sessions of Territorial legislatures shall be biennial, and under said law of the legislature of New Mexico no session can be held prior to January, 1884, unless it should be authorized by special enactment.

The acting governor sets forth certain reasons why he thinks that it would be for the advantage of the Territory to have a session of the legislature in January, 1883, or soon after.

I have the honor, therefore, to suggest that the attention of Congress be called to the subject.

Very respectfully,

H. M. TELLER,
Secretary.

The PRESIDENT.

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EXECUTIVE OFFICE, TERRITORY OF NEW MEXICO,
Santa Fé, November 30, 1882.

SIR: The Territorial legislative assembly of January, 1882, changed the time for subsequent meetings of the legislature to the first Monday in January, 1883, and thereafter every two years.

The organic act, as now and for several years in force, authorizes biennial sessions of that body, and thus fixes the next session two years from the session of January, 1882, above mentioned, and one year later than the time as above designated by the Territorial legislature. The legislative assembly elected this November is in many respects a body of men decidedly superior to the average that has preceded them.

The past three legislative assemblies have been elected fourteen months in advance of meeting. It was for this reason that the last legislature fixed the time of meeting in January following the election. This time for the meeting, if approved by Congress and authorized for each two years following, would leave the election in November previous to the meeting of the legislative assembly and at the same time now designated for the election of Delegate to Congress. This, I think, would be a wise provision, from the fact that there would be saved an additional election and the expense thereof.

In view of the large immigration now and for three years past centering upon the Territory, and the consequent new wants and necessities, I think it would be well for Congress to authorize a legislative assembly at an early day.

Should it seem impracticable for want of time to designate the first Monday in January, then I would recommend some time later—say in February or March next.

In the event of Congress authorizing an early meeting of the legislature, an appropriation of $20,000 will be necessary to cover the usual expenses.

I have the honor to be, very respectfully,

W. G. RITCH,
Acting Governor.

Hon. H. M. TELLER,
Secretary of the Interior, Washington.

P. S.—I inclose copy of a letter upon the same subject addressed to your department from this office November 10, 1880, and call your attention to that portion of the same inclosed in brackets. The original, I understand, was sent to Congress some time in December following its date.—W. G. R.

SECRETARY'S OFFICE, TERRITORY OF NEW MEXICO,
Santa Fé, November 10, 1880.

SIR: I have the honor to call your attention, and through you the attention of the President and of Congress, to the necessities of New Mexico with respect to the future meetings of the legislative assemblies and the apportionment and election of its members.

The act of Congress approved June 19, 1878, making appropriations for legislative and other annual expenses of the government, under the heading of "Government in the Territories" (Treasury Department pamphlet, page 30), records:

"That from and after the adjournment of the next session of the several Territorial legislatures, the council of each of the Territories of the United States shall not exceed twelve members, and the house of representatives of each shall not exceed twenty-four members. * * * And the several legislatures at their next sessions are directed to divide the respective Territories into as many council and representative districts as they desire, &c.: *Provided* the number of council and representative districts, respectively, shall not exceed the number of members above designated."

The first legislative assembly of New Mexico to meet after the passage of the above act was convened in January, 1880, and failed to make an apportionment. And notwithstanding the reduction of the number of members as above stated, and the failure to make the apportionment aforesaid, at the election held in this Territory on the 2d day of November just past, members of the council and house were elected as usual, under the old law, for the next session of the legislature. (Being thus elected, as the fact is now and has been for three sessions past, *fourteen months in advance* of the assembling of the legislature to which they were or have been elected to serve. The next legislative assembly of New Mexico, under the law, convenes on the first Monday in January, 1882.*)

In thus electing members as formerly authorized the old member was elected; that is, thirteen members of the council (fixed June 19, 1878, at twelve) and twenty-six members of the house (fixed June 19, 1878, at twenty-four); besides, the old apportionment of ten years ago was the apportionment under which they were elected. Clearly the legislature elect is not such a body as is now contemplated in the organic act, and as

* Reapportionment under act of Congress, June 19, 1878, made at session of 1882.

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the matter now stands, our Territorial legislature cannot be legally convened without Congressional authority.

Thus communicating the fact, I make request that such action will be had by Congress as will enable the Territory to maintain its legislative department legally and in order.

In this connection I take the liberty to suggest one of two things—either,

First. To legalize the membership of the legislature as to members and election, as elected on the 2d instant [and authorize a meeting of the legislative assembly early in 1881, not later than the first Monday in March. In support of this I will add that besides thus gaining a legislative body fresh from the people, now that immigration has been and is rapidly coming, and with its new and varied interests requiring legislative action, it will effect an opportunity for the Territory to readily adapt itself to its changed necessities. In such an event an appropriation of $20,000, or thereabouts, would be necessary to meet the usual expenses]; or,

Second. Should Congress not favor the above, then I suggest the appointing of a commission, comprised of two Territorial officers, appointees of the President, and one Territorial officer, an appointee of the government, with authority to make the necessary apportionment of members by council and representative districts, as directed in the act of June 9, 1878, fixing the time for the meeting after the census return of population shall have been made known. Also to designate the time for holding an election of said members on Tuesday after the first Monday in November, 1881, accompanied with provisions for a registration of voters for said election, and the conducting of the election and the canvass and return of the vote as now provided by law at general elections.

[Permit me also to suggest as pertinent that, in order to permanently secure a membership in future legislative assemblies fresh from the people, Congress should enact a law making it imperative to elect members of the legislature within ninety days preceding the assembling thereof.]

[Also to amend the organic act so as to make the number of members an *odd* number in each house, say thirteen members in the council and twenty-five members in the house. This suggestion is based upon experience—which is liable to be repeated—with the house in the last legislative assembly over its organization. It stood thirteen to thirteen, and at a deadlock for three days, blocking all business in both houses and losing valuable time in a session limited by act of Congress to forty days.]

[In suggesting, as first above, a session of the legislature to meet not later than March next, I would further advise the providing for biennial sessions thereafter dating from the first Monday in January, 1881,* thereby continuing the elections biennially and securing a legislative body fresh from the people by electing them at the same election now provided by law for the election of Delegates to Congress and county officers; otherwise annual elections would follow.]

The Territory being apparently without an attorney-general, as I have no doubt you have been heretofore fully advised from this office, the auditor of the Territory might be designated as a member of the commission before suggested to make the apportionment.

Very respectfully,

W. G. RITCH,
Acting Governor New Mexico.

Hon. CARL SCHURZ,
Secretary of the Interior.

* From first Monday in January, 1883.

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LETTER

FROM

THE POSTMASTER GENERAL,

TRANSMITTING,

In response to Senate resolution of December 12, 1882, a copy of the last report on the administration of the New York post-office.

DECEMBER 15, 1882.—Ordered to lie on the table and be printed.

POST-OFFICE DEPARTMENT,
OFFICE OF FIRST ASSISTANT POSTMASTER-GENERAL,
Washington, D. C., December 14, 1882.

To the President of the Senate:

SIR: Herewith find inclosed a copy of the last report on the administration of the New York post-office, as per Senate resolution of December 12, 1882.

Very respectfully,

T. O. HOWE,
Postmaster-General.

No. 1.

REPORT ON THE NEW YORK POST-OFFICE.

NEW YORK, *July* 22, 1882.

SIR: Having been directed by the Postmaster-General to make an examination of the New York post-office, for the purpose of ascertaining the needs of the same, and to make such recommendations as would in our opinion be in the interest of the service, we beg leave to submit our report of the investigation.

We have carefully examined every division of the office, and have talked with the clerks as much as possible relative to their particular duties and responsibilities. We have conversed freely with the postmaster and the heads of divisions, with a view of ascertaining the demands of the service in New York. In brief, our examination has been as thorough as it could be unless months were devoted to the task. We find upon the rolls of the office the names of exactly 800 persons, who are at present employed in performing the clerical work of the office, and who are paid annually the sum of $788,940, in salaries ranging from $4,000 to $300 each. This is exclusive of the money-order division, in which are employed 46 additional clerks, who are paid $55,050 per annum. It is also exclusive of the letter-carriers, which class will not be considered in this report.

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MANNER OF MAKING APPOINTMENTS.

We find, first, that the manner of making appointments to any official position under the postmaster at New York differs somewhat from the rules governing appointments at other large post-offices. The rules now in force were put into effect May 1, 1879, having first been ordered by the Postmaster-General and approved by the President. Under these regulations all applicants are treated alike, no matter who recommends them or to what political organization the applicant may belong. All appointments to clerical positions are made to the lowest grade, and no applications are entertained from persons under 16 or over 25 years of age, except those honorably discharged from the Army and Navy of the United States. The applicant is first referred to the medical officer for examination as to his physical condition. If report is unfavorable, the applicant is at once rejected. If the report is favorable, the application is filed and registered in its regular order. Every application must be accompanied by a certificate signed by not less than three or more than five reputable citizens, stating the time for which each has been acquainted with the applicant, and testifying to his good character, sobriety, and industry, and to the willingness of the signers to furnish personally any further information they may possess concerning the applicant, if so required by the postmaster or board of examiners. The names of candidates which have been on the register for one year without being reached for examination are regarded as removed, and will not be selected for examination unless again placed on the register by a new application, after which they are selected when reached in order.

Applications duly filed, when reached in order, are referred to the board of examiners, which consists of the assistant postmaster and the superintendents of four divisions of the office. When vacancies occur in the lowest grade, the board of examiners notify such number of applicants, not less than twenty, of those first on the register to appear for a competitive examination. The applicants are examined in penmanship, in arithmetic, in geography, in English grammar, in the history of the United States, and in matters of a public nature to the extent that may be required adequately to test general capacity or special fitness for the postal service. The examiners present to the postmaster the names of the successful candidates in the order of their excellence, and the appointments are made from the three highest names on the list. Vacancies that occur in the higher grades of any division are filled by promotions from the lower grades by means of competitive examinations, to which are admitted as competitors such persons as are employed in the division in which the vacancy exists or in divisions having similar duties. The questions in the examinations are restricted mainly to matters pertaining to the ordinary business of that division. The promotions are then made by the postmaster on the report of the examiners, selecting for each vacancy one from the three highest.

Under the rules, for positions of porters this form of examination is not followed, and the postmaster reserves from the operations of the regulations for original appointment and promotion positions of especial pecuniary trust, as well as those involving confidential relations.

After having examined the manner of making appointments and promotions in this office, we are satisfied that the postmaster is proceeding strictly in accordance with the rules and regulations. All papers bearing upon the appointment or promotion of any person are kept by the ap-

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pointment clerk, and the system for doing the work is excellent. We find that during the fiscal year ending June 30, 1882, there were 182 appointments, 52 removals, 83 resignations, 229 promotions, 32 reductions, and 12 deaths.

CONDITION OF THE SERVICE.

The efficiency of the service in New York ranks high. While there may be faults, it is a fact, nevertheless, that the service is nearer perfection, all the details being considered, than in any other city in the country. From the postmaster's room down through the different divisions of the office to the smallest suburban station every action is governed by a system so complete and so perfectly maintained that the result can only be of the highest order. Everything connected with the handling of vast quantities of mail matter at the general office, as well as in all sections of the city, is so complete that the admiration of every person who will examine and consider will be at once expressed. Every employé has certain duties to perform within a certain time, and he is held as accountable for his work as he would be were he employed at any other occupation where great care and promptness must necessarily be exercised. The rules are rigidly enforced and insubordination is not allowed. Every employé respects his superior officer, of whom he seeks information when in doubt. In fact, the entire service of handling the mails in New York is so satisfactory that we feel unable to suggest any special recommendations for its improvement. Great credit is due to the present crops of efficient officers of this service, many of whom have spent the better portion of their lives perfecting the great work in New York.

THE QUESTION OF SALARIES.

While impressed with the fact that the heads of divisions in this office and their assistants performed their duties faithfully and well, a sense of duty compels us to consider the question of salaries. The measure of personal responsibility of these various officers is wisely reduced to the minimum by the admirable system in popular use. The postmaster is postmaster in the highest and best sense of that term, and through his "order division" gives specific instructions to each, controlling and directing all the business of each division, even to the most minute detail, so that the duties of the various officers connected with the heads of divisions are but little more than ministerial in a certain sense. This state of things does not exist in the Treasury, Post-Office, Interior, and other departments of the government, where hundreds of men are employed whose daily duties demand executive capacity of the highest order, and who are accountable for almost every act, whose salaries are much below those paid the heads of divisions and their assistants in the New York office.

Considering that the proper standard of salaries is that fixed by Congress to important officers and employés in the several departments of the government, we are compelled to compare the services rendered by the employés of the New York office with others of similar serving whose salaries are fixed by law. Duly regarding merit, capacity, and character of service, our conclusions are that the heads of divisions, as well as some of their assistants, in this office are overpaid. Having reached this conclusion we have prepared a complete reorganization of salaries for this office, which we respectfully submit for the considera-

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tion of the department, as follows, to take effect September 1, 1882, if approved:

Organization of New York office as reported July 22, 1882.

No.	Name of office.	Present salary.	Total.	Remarks.
	EXECUTIVE DEPARTMENT.			
1	Assistant postmaster	$3,500 00	$3,500 00	
1	Secretary to postmaster	1,600 00	1,600 00	
1	Appointment clerk	1,800 00	1,800 00	
1	Clerk and medical examiner	1,020 00	1,020 00	
1	Clerk to assistant postmaster	840 00	840 00	
1	Messenger	900 00	900 00	
1	Messenger	360 00	360 00	
7			10,020 00	
	RECORD DIVISION.			
1	Chief clerk	1,800 00	1,800 00	
1	Recording clerk	1,080 00	1,080 00	
1	....do	900 00	900 00	
1	Clerk	480 00	480 00	
1	Messenger	360 00	360 00	
5			4,620 00	
	ORDER DIVISION.			
1	Superintendent	2,000 00	2,000 00	
1	Chief clerk	1,200 00	1,200 00	
1	Clerk	840 00	840 00	
1	....do	780 00	780 00	
1	....do	600 00	600 00	
4			5,420 00	
	PRINTING DIVISION.			
1	Clerk	1,080 00	1,080 00	
1	....do	600 00	600 00	
2			1,680 00	
	AUXILIARY DIVISION.			
1	Superintendent (lady)	900 00	900 00	
8	Clerks (ladies)	720 00	5,760 00	
9			6,660 00	
	INQUIRY DIVISION.			
1	Superintendent	2,000 00	2,000 00	
1	Assistant superintendent	1,500 00	1,500 00	
1	Blind reader	1,500 00	1,500 00	
2	Directory readers	1,200 00	2,400 00	
3	Clerks	1,200 00	3,600 00	
2	....do	1,020 00	2,040 00	
3	....do	900 00	2,700 00	
2	....do	840 00	1,680 00	
2	....do	600 00	1,200 00	
1	Interpreter	1,020 00	1,020 00	
1	Messenger	420 00	420 00	
19			20,060 00	
	TRANSPORTATION DIVISION.			
1	Superintendent	1,800 00	1,800 00	
1	Chief clerk	1,320 00	1,320 00	
1	Dispatcher	1,200 00	1,200 00	
1	....do	1,080 00	1,080 00	
3	....do	900 00	2,700 00	
3	....do	840 00	2,520 00	
3	....do	780 00	2,340 00	
2	....do	720 00	1,440 00	
6	....do	600 00	3,600 00	
21			18,000 00	

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Organization of New York office as reported July 22, 1882—Continued,

No.	Name of office.	Present salary.	Total.	Remarks.
	AUDITOR'S DEPARTMENT.			
1	Auditor	$3,000 00	$3,000 00	
1	Chief clerk	2,000 00	2,000 00	
1	Accountant	1,400 00	1,400 00	
2	Clerks	1,260 00	2,520 00	
1	....do	1,020 00	1,020 00	
2	....do	960 00	1,920 00	
1	Messenger	360 00	360 00	
9			12,220 00	
	NEWSPAPER AND PERIODICAL DIVISION.			
1	Superintendent	2,000 00	2,000 00	
1	Clerk	1,500 00	1,500 00	
1	....do	1,200 00	1,200 00	
1	....do	1,020 00	1,020 00	
1	....do	960 00	960 00	
1	....do	900 00	900 00	
6			7,580 00	
	UNPAID-POSTAGE DIVISION.			
1	Superintendent	2,000 00	2,000 00	
1	Clerk	1,500 00	1,500 00	
2	....do	1,440 00	2,880 00	
1	....do	1,200 00	1,200 00	
1	....do	720 00	720 00	
2	....do	600 00	1,200 00	
8			9,500 00	
	JANITOR'S DIVISION.			
1	Superintendent	1,020 00	1,020 00	
1	Skilled laborer	840 00	840 00	
4	Cleaners and washers	600 00	2,400 00	
1	Cleaner	360 00	360 00	
7			4,620 00	
	CASHIER'S DIVISION.			
1	Cashier	3,000 00	3,000 00	
1	Assistant cashier	1,440 00	1,440 00	
1	Book-keeper, stamp accounts	2,000 00	2,000 00	
1	Assistant book-keeper, stamp accounts	1,800 00	1,800 00	
1	Redemption clerk	1,800 00	1,800 00	
2	Wholesale stamp clerks	1,500 00	3,000 00	
5	Retail stamp clerks	1,320 00	6,600 00	
1	....do	1,200 00	1,200 00	
2	....do	780 00	1,560 00	
1	....do	720 00	720 00	
1	....do	600 00	600 00	
1	Porter, accompanies cashier to sub-treasury.	960 00	960 00	
2	Watchmen	840 00	1,680 00	
20			26,360 00	
	MAIL DIVISION.			
	Mailing division.			
1	Superintendent	3,500 00	3,500 00	
3	Assistant superintendents	1,600 00	4,800 00	
1	Chief clerk	1,320 00	1,320 00	
10	Clerks	1,320 00	13,200 00	
13	....do	1,200 00	15,600 00	
15	....do	1,080 00	16,200 00	
2	....do	1,020 00	2,040 00	
10	....do	960 00	9,600 00	
12	....do	900 00	10,800 00	
13	....do	840 00	10,920 00	
20	....do	720 00	14,400 00	
4	....do	660 00	2,640 00	
24	....do	600 00	14,400 00	
1	Messenger	480 00	480 00	
129			119,900 00	

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Organization of New York office as reported July 22, 1882—Continued.

No.	Name of office.	Present salary.	Total.	Remarks.
	Newspaper distribution division.			
3	Assistant superintendents	$1,600 00	$4,800 00	
14	Clerks	1,320 00	18,480 00	
14	....do	1,080 00	15,120 00	
6	....do	1,020 00	6,120 00	
8	....do	960 00	7,680 00	
8	....do	900 00	7,200 00	
16	....do	840 00	13,440 00	
6	....do	780 00	4,680 00	
25	....do	720 00	18,000 00	
8	....do	660 00	5,280 00	
39	....do	600 00	23,400 00	
147			124,200 00	
	Foreign mail division.			
1	Superintendent	1,800 00	1,800 00	
1	Assistant superintendent	1,800 00	1,800 00	
1	Chief clerk	1,600 00	1,600 00	
1	Clerk	1,380 00	1,380 00	
2	....do	1,320 00	2,640 00	
5	....do	1,200 00	6,000 00	
1	....do	1,140 00	1,140 00	
3	....do	1,080 00	3,240 00	
4	....do	1,020 00	4,080 00	
4	....do	960 00	3,840 00	
4	....do	900 00	3,600 00	
2	....do	840 00	1,680 00	
2	....do	780 00	1,560 00	
2	....do	720 00	1,440 00	
2	....do	600 00	1,200 00	
85			37,000 00	
	CITY DELIVERY DEPARTMENT.			
1	Superintendent	3,500 00	3,500 00	
1	Assistant superintendent (carriers)	2,500 00	2,500 00	
4	Assistant superintendents	1,600 00	6,400 00	
1	....do	1,500 00	1,500 00	
1	Chief clerk	1,680 00	1,680 00	
1	Head clerk (general delivery)	1,500 00	1,500 00	
13	Clerks	1,380 00	17,940 00	
8	....do	1,260 00	10,080 00	
20	....do	1,200 00	24,000 00	
7	....do	1,140 00	7,980 00	
12	....do	1,080 00	12,960 00	
18	....do	1,020 00	18,360 00	
3	....do	960 00	2,880 00	
21	....do	900 00	18,900 00	
7	....do	840 00	5,880 00	
3	....do	780 00	2,340 00	
17	....do	720 00	12,240 00	
13	....do	660 00	8,580 00	
14	....do	600 00	8,400 00	
9	....do	480 00	4,320 00	
174			171,940 00	
	STATION A.			
1	Superintendent	2,500 00	2,500 00	Money-order commissions allowed for clerks, $621.
1	Chief clerk	1,500 00	1,500 00	
2	Clerks	1,080 00	2,160 00	
4	....do	1,020 00	4,080 00	
1	....do	960 00	960 00	
4	....do	840 00	3,360 00	
1	....do	780 00	780 00	
1	....do	660 00	660 00	
4	....do	600 00	2,400 00	
1	....do	480 00	480 00	
20			18,880 00	

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Organization of New York office as reported July 22, 1882—Continued.

No.	Name of office.	Present salary.	Total.	Remarks.
	STATION B.			
1	Superintendent	$2,000 00	$2,000 00	Money-order commissions allowed for clerks, $517.
1	Chief clerk	1,320 00	1,320 00	
1	Clerk	1,020 00	1,020 00	
2	....do	960 00	1,920 00	
1	....do	900 00	900 00	
1	....do	840 00	840 00	
2	....do	720 00	1,440 00	
2	....do	660 00	1,320 00	
1	....do	600 00	600 00	
12			11,360 00	
	STATION C.			
1	Superintendent	2,000 00	2,000 00	Money-order commissions allowed for clerks, $346.
1	Chief clerk	1,320 00	1,320 00	
1	Clerk	1,020 00	1,020 00	
2	....do	960 00	1,920 00	
2	....do	900 00	1,800 00	
1	....do	720 00	720 00	
1	....do	600 00	600 00	
2	....do	480 00	960 00	
11			10,340 00	
	STATION D.			
1	Superintendent	2,800 00	2,800 00	Money-order commissions allowed for clerks, $1,168.
1	Chief clerk	1,500 00	1,500 00	
1	Clerk	1,080 00	1,080 00	
6	....do	1,020 00	6,120 00	
2	....do	960 00	1,920 00	
1	....do	900 00	900 00	
1	....do	840 00	840 00	
1	....do	780 00	780 00	
1	....do	720 00	720 00	
5	....do	600 00	3,000 00	
1	....do	480 00	480 00	
21			20,140 000	
	STATION E.			
1	Superintendent	2,100 00	2,100 00	Money-order commissions allowed for clerks, $623.
1	Chief clerk	1,440 00	1,440 00	
1	Clerk	1,080 00	1,080 00	
1	....do	960 00	960 00	
3	....do	900 00	2,700 00	
2	....do	840 00	1,680 00	
1	....do	780 00	780 00	
1	....do	660 00	660 00	
5	....do	600 00	3,000 00	
1	....do	480 00	480 00	
17			14,880 00	
	STATION F.			
1	Superintendent	2,100 00	2,100 00	Money-order commissions allowed for clerks, $374.
1	Chief clerk	1,320 00	1,320 00	
4	Clerks	960 00	3,840 00	
2	....do	900 00	1,800 00	
2	....do	840 00	1,680 00	
1	....do	780 00	780 00	
2	....do	600 00	1,200 00	
1	....do	480 00	480 00	
14			13,200 00	
	STATION G.			
1	Superintendent	2,000 00	2,000 00	Money-order commissions allowed for clerks, $268.
1	Chief clerk	1,320 00	1,320 00	
1	Clerk	1,080 00	1,080 00	
2	....do	960 00	1,920 00	
1	....do	900 00	900 00	
3	....do	600 00	1,800 00	
2	....do	480 00	960 00	
11			9,980 00	

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Organization of New York office as reported July 22, 1882—Continued.

No.	Name of office.	Present salary.	Total.	Remarks.
	STATION H.			
1	Superintendent	$2,000 00	$2,000 00	Money-order commissions allowed for clerks, $343.
1	Chief clerk	1,320 00	1,320 00	
1	Clerk	1,080 00	1,080 00	
1	....do	960 00	960 00	
2	....do	900 00	1,800 00	
1	....do	840 00	840 00	
2	....do	600 00	1,200 00	
1	....do	480 00	480 00	
10			9,680 00	
	STATION K.			
1	Superintendent	1,680 00	1,680 00	Money-order commissions allowed for clerks, $159.
1	Chief clerk	1,080 00	1,080 00	
2	Clerks	840 00	1,680 00	
2	....do	600 00	1,200 00	
6			5,640 00	
	STATION L.			
1	Superintendent	1,680 00	1,680 00	Money-order commissions allowed for clerks, $242.
1	Chief clerk	1,080 00	1,080 00	
3	Clerks	600 00	1,800 00	
1	....do	480 00	480 00	
6			5,040 00	
	STATION M.			
1	Superintendent	1,020 00	1,020 00	Money-order commissions allowed for clerks, $10.
	STATION R.			
1	Superintendent	1,680 00	1,680 00	Money-order commissions allowed for clerks, $68.
1	Chief clerk	1,020 00	1,020 00	
1	Clerk	600 00	600 00	
1	....do	120 00	120 00	
4			3,420 00	
	STATION S.			
1	Superintendent	840 00	840 00	
1	Clerk	240 00	240 00	
2			1,080 00	
	STATION T.			
1	Superintendent	1,440 00	1,440 00	Money-order commissions allowed for clerks, $6.
1	Clerk	360 00	360 00	
2			1,800 00	
	REGISTRY DIVISION.			
1	Superintendent	3,200 00	3,200 00	
1	Assistant superintendent	2,500 00	2,500 00	
1	....do	1,800 00	1,800 00	
2	....do	1,600 00	3,200 00	
1	Head delivery clerk	1,500 00	1,500 00	
2	Clerks	1,380 00	2,760 00	
1	....do	1,320 00	1,320 00	
3	....do	1,260 00	3,780 00	
19	....do	1,200 00	2,280 00	
3	....do	1,140 00	3,420 00	
5	....do	1,080 00	5,400 00	
9	....do	1,020 00	9,180 00	
5	....do	960 00	4,800 00	
6	....do	900 00	5,400 00	
5	....do	840 00	4,200 00	
5	....do	780 00	3,900 00	
10	....do	720 00	7,200 00	
11	....do	660 00	7,260 00	
19	....do	600 00	11,400 00	
109			105,020 00	

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Organization of New York office as reported July 22, 1882—Continued.

No.	Name of office.	Present salary.	Total.	Remarks.
	SPECIALS.			
1	Clerk to superintendent railway mail service.	$1,860 00	$1,860 00	
1	Clerk to post-office inspector	1,020 00	1,020 00	
1	Messenger	360 00	360 00	
3			3,180 00	
	Margin for contingency		480 00	

RECAPITULATION.

Executive division	$10,020 00	Janitor's division	$4,620 00
Record division	4,620 00	Cashier's division	26,360 00
Order division	5,420 00	Mailing division	119,900 00
Printing division	1,680 00	Newspaper distributing division	124,200 00
Auxiliary division	6,660 00	Foreign distributing division	37,000 00
Inquiry division	20,060 00	City delivery division	171,940 00
Transportation division	18,000 00	Branches division	126,460 00
Auditor's division	12,220 00	Registry division	105,020 00
Newspaper and periodical division	7,580 00	Special	3,180 00
Unpaid-postage division	9,500 00	Margin	480 00
Total			814,920 00
Less money-order commissions to be applied for clerk hire			4,745 00
			810,175 00
Present allowances			788,940 00
Additional allowances required			21 235 00

TABLE SHOWING CHANGES PROPOSED.

Tabulated statement of the changes proposed in salaries of employés in the post-office at New York.

[To take effect September 1, 1882.]

No.	Name of office.	Present salary.	Proposed salary.	Decrease.	Increase.
1	Assistant postmaster	$4,000	$3,500	$500	.....
1	Secretary to postmaster	2,000	1,600	400	.....
1	Appointment clerk	2,000	1,800	200	.....
1	Messenger clerk	1,200	900	300	.....
1	Messenger	300	360	.....	$60
	RECORD DIVISION.				
1	Superintendent	2,000	1,800	200	.....
1	Recording clerk	1,020	1,080	.....	60
	ORDER DIVISION.				
1	Superintendent	2,400	2,000	400	.....
1	Additional clerk	.....	600	.....	600
	AUXILIARY DIVISION.				
1	Superintendent	1,200	900	300	.....
2	Clerks, each	900	720	360	.....
3	....do	840	720	360	.....
2	....do	600	720	.....	240
	INQUIRY DIVISION.				
1	Superintendent	3,000	2,000	1,000	.....
1	Blind reader	1,800	1,500	300	.....
2	Directory readers, each	1,440	1,200	480	.....
1	Clerk	1,500	1,200	300	.....
1	....do	1,440	1,200	240	.....

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Tabulated statement of the changes proposed in salaries of employés &c.—Continued.

No.	Name of office.	Present salary.	Proposed salary.	Decrease.	Increase.
	TRANSPORTATION DIVISION.				
1	Superintendent	$2,000	$1,800	$200	
3	Additional clerks, each		600		$1,800
1	Clerk*	480	480		
	AUDITOR'S OFFICE.				
1	Auditor	4,000	3,000	1,000	
1	Inspector of accounts, branches*	2,400		2,400	
1	Assistant auditor*	2,400		2,400	
1	Accountant	1,800	1,400		20
1	Clerk additional		1,200		1,200
	NEWSPAPER AND PERIODICAL POSTAGE DIVISION.				
1	Superintendent	1,800	2,000		200
	UNPAID-POSTAGE DIVISION.				
1	Superintendent	1,800	2,000		200
2	Additional clerks, each		600		1,200
	JANITOR'S DIVISION.				
1	Head janitor	1,320	1,020	300	
	CASHIER'S OFFICE.				
1	Cashier	4,000	3,000	1,000	
1	Chief clerk, stamps	2,200	2,000	200	
1	Assistant chief clerk	2,000	1,800	200	
1	Redemption clerk	2,200	1,800	400	
	MAILING DEPARTMENT.				
1	Superintendent	4,000	3,500	500	
3	Assistant superintendents, each	1,800	1,600	600	
1	Additional clerk		900		900
2	Additional clerks, each		840		1,680
	NEWSPAPER DISTRIBUTING DIVISION.				
3	Assistant superintendents, each	1,500	1,600		100
2	Additional clerks, each		900		1,800
1	Additional clerk		840		840
4	Additional clerks, each		720		2,880
6	....do		600		3,600
	FOREIGN DIVISION.				
1	Assistant superintendent	2,200	1,800	400	
1	Clerk	1,800	1,600	200	
2	Additional clerks, each		900		1,800
2	....do		840		1,680
1	Additional clerk		720		720
	CITY DELIVERY DEPARTMENT.				
1	Superintendent	4,000	3,500	500	
1	Inspector of stations*	3,000		3,000	
1	Assistant superintendent	3,000	2,500	500	
4	Assistant superintendents, each	1,800	1,600	800	
3	Additional clerks, each		900		2,700
2	....do		840		1,680
	STATION A.				
1	Superintendent	2,460	2,500		40
2	Additional clerks, each		840		1,680
	Money-order commissions, formerly paid superintendent			621	
	STATION B.				
1	Superintendent	1,980	2,000		20
1	Additional clerk		840		840
	Money-order commissions, formerly paid superintendent			517	

*Out.

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Tabulated statement of the changes proposed in salaries of employés, &c.—Continued.

No.	Name of office.	Present salary.	Proposed salary.	Decrease.	Increase.
	STATION C.				
1	Superintendent	$1,980	$2,000		$20
1	Additional clerk		900		900
	Money-order commissions, formerly paid superintendent			$346	
	STATION D.				
1	Superintendent	2,460	2,800		340
1	Additional clerk		900		900
1	....do		840		840
	Money-order commissions, formerly paid superintendent			1,168	
	STATION E.				
1	Superintendent	2,040	2,100		60
1	Additional clerk		900		900
1	....do		840		840
	Money-order commissions, formerly paid superintendent			623	
	STATION F.				
1	Superintendent	2,040	2,100		60
1	Additional clerk		900		900
1	.... do		840		840
	Money-order commissions, formerly paid superintendent			374	
	STATION G.				
1	Superintendent	1,980	2,000		20
1	Additional clerk		900		900
	Money-order commissions, formerly paid superintendent			268	
	STATION H.				
1	Superintendent	1,980	2,000		20
1	Additional clerk		840		840
	Money-order commissions, formerly paid superintendent			343	
	STATION K.				
1	Superintendent	1,620	1,680		60
1	Additional clerk		840		840
	Money-order commissions, formerly paid superintendent			159	
	STATION L.				
1	Superintendent	1,620	1,680		60
	Money-order commissions, formerly paid superintendent			242	
	STATION M.				
	Money-order commissions, formerly paid superintendent			10	
	STATION R.				
1	Superintendent	1,620	1,680		60
	Money-order commissions, formerly paid superintendent			68	
	STATION T.				
	Money-order commissions, formerly paid superintendent			6	
	REGISTRY DEPARTMENT.				
1	Superintendent	4,000	3,200	800	
1	Assistant superintendent	3,000	2,500	500	
2	Assistant superintendents	1,500	1,600		200
8	Additional clerks		600		4,800
1	Additional clerk		900		900
1	....do		1,020		1,020
	Increase of salaries of low-grade clerks				2,280
	INSPECTOR'S OFFICE.				
1	Clerk	840	1,020		180
1	Messenger	240	360		120
	Total			26,465	47,700
					26,465
	Additional allowance required				21,235

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SUMMARY.

The most important changes recommended, as will be seen by the tabulated statements, are the abolition of four offices, namely: One inspector of branches, whose salary is now $3,000 (formerly $4,000); one inspector accounts at branches, whose salary is $2,400; one assistant auditor, whose salary is now $2,400; and one clerk in the transportation division, salary $480.

We have made these recommendations because we consider the offices of little or no account to the service. The officers are men for whom we cherish the highest regard, two of whom have been in the service for many years. It is possible that provision can be made for them elsewhere.

The next in importance of the changes recommended is the reduction of the salaries of the heads of divisions, namely: That of assistant postmaster, from $4,000 to $3,500; that of superintendent of mails, from $4,000 to $3,500; that of superintendent of city delivery from $4,000 to $3,500; that of the superintendent of the registry department, from $4,000 to $3,200; that of the auditor, from $4,000 to $3,000; that of the cashier, from $4,000 to $3,000. Our reasons for making these recommendations, without going into details, may be found in a foregoing paragraph, under the head "The question of salaries." The same reason will answer in a measure for our recommending the reduction of the salaries of the assistant superintendents and others.

The next important change recommended is the withdrawing of the money-order commissions from the superintendents of the branch offices, who heretofore have received them in addition to their regular salaries. As we understand the law, it means that the commissions on the money-order business shall go to the clerk or clerks who perform the work, and shall be considered as his or their compensation, or, if not sufficient, the balance to be paid out of the regular postal allowance. It is our intention, therefore, that, should this report be adopted by the department, the salaries of superintendents of branches remain as we have fixed them in the foregoing plan of organization, and that the money-order commissions be allowed toward the amount necessary to pay the clerks doing the work at the various branches.

The commissions allowed at the branches amount to $4,745 per annum, which sum you will find deducted in proper form from the allowance necessary to pay clerks, as tabulated.

We have recommended a reduction in the high-salaried positions to the amount of $18,185, and a saving of $8,280 by the abolition of certain offices, making a total saving of $26,465. We have also recommended an increase in certain salaries, amounting to $2,100, and an additional allowance of $45,360 to provide for the payment of 56 additional clerks and a large number of promotions.

The new clerks are to be placed as follows: Order division, 1; unpaid-postage division, 2; transportation division, 3; register division, 10; city division, general office, 5; mailing division, letter clerks 3, paper clerks 13, foreign clerks 5; branch A, 2; B, 1; C, 1; D, 2; E, 2; F, 2; G, 1; H, 1; and K, 1. It will be observed that we have given the mailing division and the register division the largest number of additional clerks; we have done this from the fact that the work in these divisions is increasing, and additional help is more necessary than in the other divisions of the office.

The working force of the office is made up principally of young and energetic men. There are, however, several old men who, for their

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long service, are allowed to remain, although of but little service; yet, comparatively speaking, the number in this class is not large.

In conclusion, we desire to say that the postmaster and his assistants have kindly furnished us with every facility for obtaining such information as we desired relative to the duties of the service. Every examination has been conducted in a plain, business-like manner, and we feel satisfied that no facts have been kept from us that would have aided us in arriving at satisfactory conclusions.

Respectfully submitted.

J. E. STEWART,
B. D. ADSIT,
E. A. CLIFFORD,
Commission.

Hon. FRANK HATTON,
First Assistant Postmaster-General.

No. 2.

THE FREE-DELIVERY SERVICE IN NEW YORK CITY.

NEW YORK, N. Y., *October* 21, 1882.

SIR: We have executed your orders regarding the inspection of the office at New York with some minuteness, and, with reference to the city delivery division, especially with reference to the application of Mr. Postmaster Pearson for 77 additional letter-carriers. You have considerately alluded to the fact that we have recently so inspected all the important offices of the United States, and are aware of our desire, as repeatedly expressed in our recommendations, to equalize the service throughout in the matter of allowances of force, with only the consideration of, I, good service; II, needed accommodation of the people; and III, the relief of the carriers, if demanded, even if this exceeds the first two considerations, and Mr. Pearson's application expresses his desire not "to ask more than can be granted with due regard to the claims of other localities."

However, we found Mr. Pearson apparently of the opinion that increase of service was necessary as a mere matter of business; the increase of the number of carriers being certain to add, in his opinion, net revenue in excess of the added cost; and he claimed that no other motive supported his application. How cogent this would appear we cheerfully grant, provided its truth were sustained by the proof of correct premises. Of this we submit that after joint labor of some weeks we are not assured. In our second interview with Mr. Pearson (Mr. Hall not having been physically able to commence work when we arrived), asking him if he had any suggestions to offer as to our work, he said he had none, and "I have simply asked for exactly what is needed, and that is all there is of it." No courtesies have embarrassed us in the discharge of our duty to make inquiry into every department of the service, and such information as we have sought has cheerfully or at least freely met our demands upon the postmaster, Superintendent Richards (who is an able and experienced man), and his assistants and superintendents of branches, among whom are many bright, industrious, and faithful officers.

If we shall seem to you to have spent much time in this work, we refer to its great requirements here in the metropolis of a vast country; to

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the concentration here of an immense revenue-producing business; to the fact that here, in a territory hardly exceeding the delivery district of some western cities, is concentrated not only the business of the million and a quarter of people who reside here, but also the business, to a great extent, of that other million who live and sleep in its suburbs, and circumstances which, by business rules, indicate here that concentration which produces the largest ratio of income to expenditure as a logical expectation, especially in the interchange and delivery of vast and increasing mails in a comparatively small and compactly settled area. Here within a district of 15 miles by 2 miles are fifteen post-offices and branches, with an average of nearly 90,000 patrons each. How great would be their interchange of mails if they were separate offices, and how immense is the reasonable expectation as to its resources in postage if we make this interchange "local" and give them the great facilities of the system the people here enjoy.

How much this amounts to in comparison with resources from other sources, or in comparison with its expenditure now or in the past, we are unable to say or to find, as no stamp count has been made here recently; nor are we able as a consequence to estimate what fact there may be that still increased net revenue would follow as a consequence the addition of carriers as a department investment. So far as the report of postage on local matter is related to the number of pieces delivered, there is no exactness, for it has been based on daily report of counts where no count is made except in comparatively few stations, if at all, and we do not find the record of any recently established base for the daily estimates which stand for and are duly reported to the department as count. We are glad to say, however, there seems some disposition to reform in these respects, and Superintendent Richards has promised us that he will, as soon as practicable, secure the count of stamps on local matter necessary to accuracy in this matter, and since we came here some of the stations have begun to count matter. At the request of Mr. Hall, count and weight were reported for three stations September 28, and this was followed, at our request, by a general report of count and an actual weight of mails throughout the city by order of Mr. Pearson on days selected as fair average days, on Thursday and Friday, 5th and 6th instant (the selection of days being Mr. Richards' own).

From this reported count and actual weight we have gleaned certain facts, as also from our investigation upon other matters of the detail of labor performed in delivery and collection, which we have compiled in three separate single sheets attached to and accompanying this report for your information.

Reference to the compiled notes, in which we have undertaken to compare the service as to its minute divisions and as to localities, and to sum up as a whole, will, we think, confirm our opinion that the so-called report of pieces collected and delivered and the report of postage on local matter are the result of estimates not sufficiently based on fact, but as a rule made to gradually increase upon the general fact of necessary growth as all business grows, and with a reasonable allowance for brisk months and dull months in the general business. The force of this habit of reporting count which is not counted will appear in many instances, if you will take the trouble to examine original reports of 5th and 6th, which are not made a part of this report, but which we forward in bulk for future consideration (package marked B. R. W. G.).

As an example of the want of the proper relation of count reported and the actual weight of the matter carried, we refer to three important

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up-town stations similarly situated as to matters indicating similar service, Table A; also to ratio of count reported to the actual weight at main office, where (leaving out the register delivery) the count was, 5th, 143,107; 6th, 143,992; a difference of only 885 pieces, against which there is a difference of 4,894—3,495=1,399 pounds, almost wholly unaccounted for, and no explanation could be made for it by Mr. Richards, chief of division, or Mr. Bowne, superintendent of delivery at main office.

A steamer arrived on this latter day, and while it might have added 1,400 pounds to the main-office delivery, neither the explanation of one, that steamer mails weigh heavier than domestic mails, or of the other, that steamer mails weigh lighter than domestic mails, failed to disprove our opinion that the report of count was the result of habit and not of actual count, even under special orders to make a count.

So in the matter of collection report we found at several places the *book record* of pieces collected made as early as the 28th September for the entire month, and *footed up* for *report of* September! Thus is the reputation of the office for dispatch and promptness of reports exemplified, even if we must have some qualms of doubt as to some minor matters, as of facts, &c. In this report, and the evident deduction as to our opinions and conclusions, we must not be understood as favoring the opinion that count, as usually reported, has the tendency to exaggerate the amount of pieces handled. On the contrary, Mr. Hall's experiment in this field of investigation in Philadelphia, Chicago, and Saint Louis leads to the conclusion that bogus report made by the man who shirks the count is apt rather to understate than overstate the amount handled, and this reported count in New York, under tests made, we believe to have that tendency. As to whether count omitted or shirked, if it be the rule of the office to count, shall be continued as the base of estimate for the figures representing business done, and as a base for the report of postage on local matter delivered by carrier, or shall be abandoned for a system of weights at stated intervals, we urge the action of the department, as there are grave defects and positive faults in the present practice. Taken for what it is worth, the experiment here and elsewhere has confirmed the conclusion that if books and heavy matters be left out, the average mails of all classes approximate thirty pieces to the pound in city and suburbs. Upon the important matter of "postage on local matter" Mr. Richards' determination to arrange for a truthful report of it will be gladly accepted as a reform in the New York office.

As to the question of frequency of delivery and of collection, we reply they cannot be too few to suit the most exacting favorite of the office in any part of the city. In frequency they exceed the allowance in main district, three times per day in delivery and ten times per day or more in collection, as compared with the service of main district in the most favored of other offices; in the up-town principal districts for the entire city up to Harlem, inclusive, they exceed in delivery two to three trips per day and in collection nine to ten times per day, as compared with similar districts elsewhere, and in the upper districts, in each of which some horse service is had, they exceed the allowance in any other similar locality from one to two trips per day in each. As you have asked full information, you will pardon an unusual elaboration on this matter in our report, and we shall account for every man in the carrier service, every one of whom is actually engaged in his appropriate duty; and here we take occasion to answer that the discipline of the force is quite severe enough, and their time, present or absent, prop-

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erly accounted for and recorded in a system of the office quite satisfactory. They are, as a rule, an efficient working force, go almost invariably on the tap of the bell, and are recorded accurately as to their return. They are rigidly held to account for tardiness by the loss of time, and the discipline is rather exacting than slack. They are reasonably well dressed, though there is no system in the office by which complete uniformity of make-up is secured, nor uniform cheapness secured to the carrier. We think the service would be improved here in securing such suits as are required, or parts of suits needed in spring and fall, and by contract, so as to secure the lowest price to the men, absolute uniformity, and semi-annual renewal.

Beginning with main office, the detail is as follows: Of 132 carriers, 96 are on delivery service, 91 on ordinary, and 5 on register mail. One carries the mail to Governor's Island military station three and sometimes four trips per day. (It would appear that from the soldiers who serve that station on detail of various kinds there might be a detail of one messenger for this special service of the post's mail.) Forty-five routes in main-office district, extending from Battery to Canal street, are served by 90 men, who double on the first two regular general trips; after that each route is worked in alternation by each of the two men, three times each day in alternation. Thus the route gets eight deliveries, and the men each make five trips. Thirty-six men are employed as collectors, and work in reliefs of 12 men; each set working simultaneously is called a "tour." First tour goes at 5 a. m. and are off for the day at 6.50 p. m., having collected eight trips of 30 to 35 minutes each (and this includes "facing up"), and having been off from 10 a. m. to 2.30 p. m. After making the first collection this "tour" makes a special delivery between 7 and 8 a. m., which is called a *market* delivery. It embraces parts of 14 routes, and is made while the delivery force is making up the first regular trip; and, with the eight deliveries reported above, makes nine deliveries in certain parts of main-office district. The second tour begins collection at 10 a. m.; makes nine trips, 30 to 50 minutes each; have an hour off, 3 to 4 p. m., closing the day at 7.30 p. m. Third tour begins 1.30 p. m., collects eight trips, closing the day at 9 p. m. With differing arrangement of tours, the collections from 21 per day at branch A, to 15, 14, 13, the same system extends in collection service to and including Harlem.

Main office.—In delivery service, the day is closed at 5.30 p. m., and the hours on duty are not excessive, though, as everywhere, there are some heavy loads in the morning, and especially, as everywhere, on Mondays. At Station A, delivery closes at 6.15 p. m., except a small eighth delivery to hotels; B, eight trips, ends its delivery at 6.30, and on one route at 6 p. m.; D closes its seven deliveries at 7, while C is still delivering mail till 8.20 on all its routes except fourteenth, which ends at 6 p. m.; E serves all its routes till 8.20 p. m., while F serves thirteen routes till 8.20, and closes its single-service route at 5.20; G carries fourteen routes till 8.20, while five single-service routes are closed at 6.15; H and K carry mail till 7.30, while L (Harlem) delivers to 7.45; M (west of High Bridge) a very light but large district, makes four deliveries to all districts but one, and closes at 6.15, except in one district near the office, where there is delivery to 7. Two of these districts are mounted. R (Morrisania) closes its three-trip delivery district at 6 p. m., while all the other routes are carried to 7.50. The High Bridge service is attached to this station, and is performed by two foot-carriers, who make four deliveries and collections per day on a very thinly-settled district, and have a substation in the little railroad

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station, the superintendent being an agent of the railroad, and there is no charge for rent, and the books are in nice order; the subsuperintendent gets a small nominal salary; the delivery is to 6 p. m. S, an extremely north-limit station, has four horse-routes, delivering to 6.40 p. m. All are mounted here, and, as at M and T, make their own collections before the first delivery.

Mr. Pearson asks in his detail "to be assigned" one carrier for this station S. Mr. Richards suggests transferring the upper of M district to S. It lies near the station of S, but as both these districts, having three and four deliveries per day, seem quite well served, and have such suburbs as in other cities would get only two deliveries per day except in one or two routes in M, we cannot advise the transfer, if it is to take another carrier. A transfer of one man's district to S from M might make the work easier. He seems quite satisfied to serve it as at present. Branch T has a sparse settlement for the greater part, and has two horses on routes delivered two times and three times per day, and five fast routes are served four times per day to 6.20 p. m.

The time of beginning service in delivery in stations is from 7 to a short time after, and this is the beginning of service of carriers on delivery up to the river. Above that the men (doing their own collection) begin the day with the collection.

The detail of collection above Canal street is on detail as follows: A, 12 men collecting in tours a district of 97 boxes, delivered by 40 men; there are 21 collections. B, 8 collectors in district delivered by 25 men; make 14 collections from 75 boxes. C has 9 collectors; make 15 collections from 97 boxes; district delivered by 27 men. D has 12 collectors; make 15 collections from 115 boxes in a district carried by 38 men. E, 12 collectors collecting 123 boxes; make 15 trips; the route is delivered by 38 men. G has 91 boxes in its district; 9 men make 15 collections, and the routes are delivered by 33 men. On five routes where there is single service the carriers also collect their district, and there being two tours of 4 men each, the odd man makes a special collection of *only four trips*, and the balance of the time we don't think he is on very exhaustive service. The trips he makes seem to be a kind of auxiliary relief. F has 9 collectors, who make 15 collections in a district of 91 boxes. H has 6 collectors, making 14 trips and collecting 70 boxes. K has 6 collectors making 14 collections of a 50-box district, and thinks his collection duty as hard as any service the men perform. L has a district above One hundred and tenth street, running across the city from river to river; has 6 collectors, and collects 13 trips, having 75 boxes; the lowest street is One hundred and thirty-second street, above the post-office, and he runs up to Morrisania and to the M district on the north and west.

Above this, as stated, carriers do their own collection in M, R, S, and T branches. They are all very large districts, with many excellent and even fine residences and large grounds, but sparse settlement. Further and more explicit detail of service in delivery may be found in sheet B, attached hereto, and compiled for your information and for future reference by ourselves; also as to collections, in sheet C, attached. As to the day's work of each, these reports are devised from personal inspection and compilations, and show ins and outs precisely.

The scheme of city mail service is elaborate to the verge of profusepess, as the collections in certain hours would appear to be. The special register delivery service, by five carriers detailed to this duty, is good and wise service, and is, no doubt, a saving of labor to the whole force at main office. The duty would seem light, being two trips, from 9 a. m.

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to 12 m., and from 2 to 4.30 p. m. Mr. Pearson's application for some additional service here would appear to be based upon the just requirement that this delivery must be made within certain business hours. Aside from main district, the delivery of registers is regular with other morning mails.

The whole register delivery is made with slip receipts between the office and its branches and the people, in red and black duplicates, and no receipt books are carried. The system uses a very large quantity of large bound books, in which the duplicates occupy alternate sheets, and these, even at branch offices, are filled in a week. The returned slips will be difficult to look up for reference in a year, and the system may prove to have inconveniences somewhat offsetting its evident merits.

There are more than 1,400 street boxes on the various streets, and in houses down town, and in few localities could there be needed additions to the present number. The boxes in main-office district, about 240, are the open-door box, with large label plate under glass, and printed collection scheme, and "next collection" cards. We do not think them advisable for universal use. Water gets in during storms, damaging labels and the printing of the scheme, and the renewing of them when spoiled would seem to be quite an item of annoyance and expense for common use. There is no attempt to record the collection in any other part of the city, though fourteen to twenty-one collections are made. The people evidently know they are collected frequently enough.

There are still some street letter boxes in certain large exchange and office buildings closed at certain hours. There seems no complaint on this point, and the service is particularly interesting to only such as occupy these houses, and there seems no cogent reason for removing the boxes, except that it is against the rule to have them so; we should keep the rule or amend it. Two of these and a paper lock-rack, and quite a little post-office box-case, with Yale locks, are in the "Equitable," closed at 8 p. m. The service is for tenants, and the boxes in the hall enables the carrier to deliver mail to many people instead of going up the elevator. There seems no complaint by the public. In some cases the mail delivered here is to persons not in their office till 9 a. m. Indeed, we find at general post-office much matter as "short paid," &c., left at routing-case of carriers, because earlier than 9 o'clock there is no one to pay the dues. This reminds us to allude to the system of account, very elaborate, exact, but costly, by which due matter in the city is accounted to stations and carriers, a credit plan which, while old and honorable, would, so far as the carrier service is concerned, be better, take less valuable work and costly help, and be no hardship to carrier if he were required to pay down for his due letters.

We find the ten horses employed in delivering in upper districts quite indispensable, serving districts fully and often, where great additional foot service would be required. We do not find the use of street-car allowance excessive. The mail-messenger, up-town, and cross-town service is very elaborate by wagon and elevated railroads, and, as to our view of the service generally in this connection, of a too profuse delivery and collection, quite out of proportion to the allowance elsewhere; it is partly due only as a matter of connection with a service which delivers mails at some stations, for instance, in the neighborhood of fifty times a day. We think the exact needs of business men and of residents would be fully met in many cases by fewer midday collections and by two less deliveries per day, and while we are responsible for the recommendations by which the allowance of carriers is made by your department throughout the country, and say this with "the just claims

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of other localities" in constant view, and while our interviews with people in the main district sustain this view, we do not make the expression of our opinion with the intention of recommending any radical change in the *status quo* of New York's amplified city service, for, first, the people have grown up to this expedited service and regard it as a special service to which they are entitled, and one which has been made as a special favor to their representative and influential citizens. We have found in other places that a midnight collection apparently becomes a necessity *because of its establishment*, and so in a sense an elaborate service is apparently necessary though exceeding any just demand merely because it exists. In our opinion five straight and full deliveries up town would be quite frequent enough to please the most exacting, *so far as the people are concerned*, and this we could support with evidence. It will appear upon examination that two men serve a route in *all morning deliveries* which each of these men serves alone in alternate deliveries the balance of the day.

The serving of the late delivery, while his actual service is not heavy in *hours of travel*, makes the hardship to the carrier of a long day's duty, though not exceedingly many hours on the road. This, with the relief of the burden of the heavy morning mail, go together, in our opinion, in the question regarding the hard work of carriers. In no other place is the delivery of a late mail like this required or performed, and while some people may appreciate it, it is admitted that many don't want it. For obvious reasons no radical change can at present be recommended, and while this is so, our recommendation for additional carriers is made only in this view. We have found no man who demands his mail more than five times per day, and the observations of men who represent the large business of the city is that they don't want mails too frequently. This fact is also apparent in the fact of very large mail getters who prefer to serve themselves by boxes and in various ways, by messenger, and in the special general delivery to large business firms, banks, &c., and the large amount of mails boxed to bags, satchels, pouches, and boxes belonging to up-town patrons, some of whom will not receive mail through carrier; and we note cases where a distribution to street and number in a branch district is returned from the branch to main office for boxing, though the addressee has his business house in the branch district. This does not seem good service, but great pains is taken to gratify influential men.

The general delivery and box delivery, delivery to banks and large houses by special window, &c., is very large, and while not seeming an evidence of the reception such a profuse service should merit, it greatly relieves carrier service, especially at main office.

Service at some stations also seems to be, to a very great degree, in the windows and not by carrier. One station, for instance, is so far from securing a universal carrier delivery as to deliver on call and through window nearly or quite 15 per cent. of its entire mail on some days, while an examination of one week as to its collections shows that its drops are five-sixths as much as its collection by carrier, thrugh the routes are collected fifteen times per day. Where a service is so expeditious, it would seem as if the people would almost universally embrace its privileges, as they do even less generous service in other places. The city is prosperous, crowded, growing. New places are building and all new buildings are good and modern. Where they replace old ones they are higher, but they do not specially increase the labor of delivery, for they put elevators in all new large buildings. Climbing is hard work, but we do not find the proportion of climbing to be excessive here.

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The system of distribution here is at present undergoing some reform, and the separation in a new set of cases will improve it. They have just been put in this week. The system at present seems to require something too much of the carrier force. We see them "throw back" every morning mail addressed to places in their route which belongs to box-holders. In some cases box-holders have hundreds of people in their employ or connection, for which box privilege is claimed. In returning to distribution, time would be lost, it seems, and the carrier is required to mark box number on all matter improperly distributed to him, and this in his busiest hour, while preparing the early delivery. Baskets of mail are thus marked and returned to redistribute on a single morning.

While there is so generous a service, it will not appear that the actual labor equals the general average in "out" hours throughout the country per capita; trips of collection and delivery will be found not to average long, and though the double service part day and single service part day makes one man long to-day, he is short to-morrow, and this is held to justify the usage. In other cases single service is adopted as the rule of the station. Experience of the whole service indicates the greater evenness of service on the single-service plan and the greater economy of service. The intervals of rest in both the delivery services here indicate no great hardship, except occasional too large loads, and the carriers, some of them, seem to enjoy this. It would appear that in so frequent a collection there is no great amount of excessively heavy labor in the collection; and while this is true, there are some routes where at some hours there is a pretty large load. We think here, as elsewhere, these big loads will be found at times when the streets are not most crowded with traffic, and that here, as elsewhere, relief might be found in massing mail on foot in the crowded districts and bringing to office by wagon.

In the matter of closeness of delivery, we do not find the service quite up to its liberal and generous supply in the features we have dwelt upon, and it would seem the carrier in the fields delivered seven or eight times per day might find time to better inform himself and the office as to where people who are moving have come from and have landed, or where people who have gone *have* gone. The number of the letters returned daily to the office by the carriers' separate reports is very large, in cases forty per man per day. Of course this matter cannot be made approximately perfect except by specially good work. But after these letters have been finally reduced from thousands per day by delivery, by return to writer, by sending to some other office, the amount finally reported to the department is greatly overestimated, or it amounts to nearly a million per year, while only four thousand or so of these are "refused."

We find the large forces dispensing this liberal service have been distributed with reasonable skill, and equally as perhaps possible.

In the matter of hours on duty, there is necessarily the relation of load to distance of travel everywhere to consider; the service starts later and closes later, as a rule, than elsewhere; the hard points we have indicated as the late up-town delivery, the early morning load, and the occasional large load in collection, and the long walk of so many trips per day.

As to the late delivery, we would see it so shortened as not to abruptly cause any just complaint from the comparatively few we would expect to complain at all. We would have only hotel delivery after 7 p. m., and this by detail, making it easy on the force. We would find a rule for division of the morning trip, making it less burdensome, as it sud-

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denly drops now from a burden at one hour to a light trip, as a rule, all the balance of the day. We would assist the heavy evening collection by wagon. We would not exceed the present frequency of delivery or collection in any part of the city. He must be hard to suit who would demand a more generous service or harder work by the carrier anywhere in New York. We would not abridge any absolutely needed and generally demanded convenience a reasonable people can ask here, and we would even grant to the carriers of New York the metropolitan privilege of short hours and the early return to their homes (the habit of metropolitan people); and while we do not recommend any rapid or radical change not duly considered and honestly entered into, and therefore do not demand any immediate reorganization of work requiring any great change of the elaborate system of the delivery here, we offer suggestions by which we think the satisfactory system of delivery in New York may be rendered easier to those who do its labors.

We have separately, and without consultation, estimated the present relief needed, *not to expand, but to relieve the service.* In this we have thus estimated the number within two points of the same figure; and though we find the labor here actually below the avearge in smaller places per man, we know the difficulty of equalizing it without new men.

We return Mr. Postmaster Pearson's application with our indorsement.

Respectfully,

SAM'L SMITH,
H. W. HALL,
Inspectors on Free Delivery Service.

Hon. JAMES H. MARR,
Acting First Assistant Postmaster-General, Washington, D. C.

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47TH CONGRESS, 2d Session. } SENATE. { Ex. Doc. No. 17.

LETTER

FROM THE

SECRETARY OF THE INTERIOR,

TRANSMITTING,

In response to Senate resolution of December 15, 1882, a letter of the Commissioner of Indian Affairs of the 14th instant, submitting report dated the 12th instant, and its accompanying documents, on the claims of the Old Settler Cherokees, &c.

DECEMBER 16, 1882.—Referred to the Committee on Appropriations and ordered to be printed.

DEPARTMENT OF THE INTERIOR,
Washington, December 16, 1882.

SIR: I have the honor to acknowledge receipt of the following resolution of December 15, 1882, viz:

Resolved by the Senate of the United States, That the Secretary of the Interior be, and he is hereby, directed to report to the Senate, as early as possible, any papers or information in his possession touching the result of any investigation that he may have completed under the direction of that provision of the act "making appropriation for sundry civil expenses of the government for the fiscal year ending June thirtieth, eighteen hundred and eighty-three, and for other purposes," relating to any dispute between the Cherokee Indians or any part or band thereof, and the United States, "arising from or growing out of treaty stipulations or the laws of Congress relating thereto."

In compliance with this resolution, I have the honor to transmit herewith a copy of letter of the Commissioner of Indian Affairs of the 14th instant, submitting report dated the 12th instant, and its accompanying documents, on the claims of the "Old Settler" Cherokees, by Mr. C. C. Clements, special agent, appointed by this department under the provisions of the law of August 7, 1882, requiring the Secretary of the Interior to—

Investigate and report to Congress what, in his opinion, would be an equitable settlement of all matters of dispute between the Eastern Band of Cherokee Indians (including all of the Cherokees residing east of the Mississippi River) and the Cherokee tribe or nation west; also, all matters of dispute between other bands or parts of the Cherokee Nation.

The Commissioner of Indian Affairs, to whose report special attention is invited, states that from the imperfect examination which he has been able to give the report, it appears to be in accordance with the history of the transaction. He, however, suggests that the report may be affected and changed when the other questions connected with this one are examined.

The figures contained in the report of Mr. Clements have been carefully examined by the Indian Office and by this department, and are found to be correct.

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Attention is, however, invited to the fact that the $887,480.15 deducted on page 9, stated as the amount of payment of $532,896.90 with interest added for the time stated, is not exactly correct mathematically, but is in exact accordance with the account as stated upon the books of the Indian Office.

Very respectfully,

H. M. TELLER,
Secretary.

The PRESIDENT OF THE SENATE, *pro tempore.*

DEPARTMENT OF THE INTERIOR,
OFFICE OF INDIAN AFFAIRS,
Washington, December 14, 1882.

SIR: I have the honor to transmit, herewith, report of Special Agent C. C. Clements upon the claim of "Old Settler" Cherokees, informally referred to me for examination.

This claim appears to be based upon alleged errors committed by the officers of the government having charge of and stating the account between them and the United States, in relation to their interest in the proceeds of the sale of Cherokee lands, under the treaty of 1835, and the settlement under the treaty of 1846.

From the imperfect examination which I have been able to give the report in the few hours since it came into my hands, it appears to be in accordance with the history of the transaction. It must be borne in mind, however, that there are several transactions with the United States Government to which the Cherokees are parties. One is with the "Old Settler" Cherokees, one with the Western Cherokees, of which the "Old Settler" Cherokees are a part, but a separate transaction. Another is with the Eastern Band of Cherokees, being a part of the original Cherokee Nation; and still another question referred to Mr. Clements for examination is a settlement between the Eastern and Western Cherokees, in which the final settlement of all these questions will determine whether the government may or may not be a party. All of these four questions in dispute, the final settlement of which is contemplated by the act of Congress authorizing the Secretary of the Interior to adjust them, involves an interest in land or the proceeds derived from the sale of lands, both east and west of the Mississippi River.

The subject-matter treated of in this report, and the amount found due, may be very materially affected and changed when the other three questions connected with this one are examined. Mr. Clements, who makes this report, agrees with me in this. In view of these facts, I think it would be much safer for the government and more equitable to all parties concerned, to delay all Congressional action until all of the questions involved in which the Cherokee people are parties, either as between themselves or the government, can be examined and reported upon.

I therefore recommend that no Congressional action be had until the report is made as an entirety upon the questions specified in the act of Congress authorizing their settlement, believing that to be the only safe course for the government to pursue.

Very respectfully, your obedient servant,

H. PRICE,
Commissioner.

The honorable the SECRETARY OF THE INTERIOR.

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DEPARTMENT OF THE INTERIOR,
Washington, D. C., December 12, 1882.

SIR: By act of Congress approved August 7, 1882, it was provided as follows:

"The Secretary of the Interior shall investigate and report to Congress what in his opinion would be an equitable settlement of all matters of dispute between the Eastern Band of Cherokee Indians (including all the Cherokees residing east of the Mississippi River) and the Cherokee tribe or nation west; also all matters of dispute between other bands or parts of the Cherokee Nation; also all matters between any of said bands or parts thereof and the United States, arising from or growing out of treaty stipulations, or the laws of Congress relating thereto, and what sum or sums of money, if any, should, in his opinion, be paid under such settlement, and the sum of two thousand five hundred dollars is hereby appropriated for such investigation."

In pursuance of my appointment as a special agent of your department, charged with the investigation of all matters named in said enactment, I have the honor to submit the following report on the claim of the "Old Settler" or Western Cherokee Indians against the United States:

REPORT.

I deem it unnecessary to refer in this report to the history of the "Old Settler" or Western Cherokee Indians, or their relations to the Eastern Band of the Cherokee Indians prior to the treaty of 1835, as that is fully given in two reports herewith, recently made by Senate committees on the same subject, and will merely state that the "Old Settler" Cherokees are a band or part of the Cherokee Nation.

Their claim is based upon alleged errors committed by the officers of the government having charge of and stating the account between them and the United States in relation to their interest in the proceeds of the sale of the Cherokee lands east of the Mississippi River, as provided in the treaty of 1835, between the United States and the Cherokee Indians.

It also appears by the terms of the fourth article of the treaty of 1846, that in consideration of these claimants consenting to the stipulations therein contained—that the lands formerly owned by these claimants, exclusively, west of the Mississippi River should thereafter be the common property of the whole Cherokee people—a basis of settlement of their claim against the United States was agreed upon as follows:

"All the investments and expenditures which are properly chargeable upon the sums granted in the treaty of 1835, amounting in the whole to five millions six hundred thousand dollars (which investments and expenditures are particularly enumerated in the 15th article of the treaty of 1835), to be first deducted from said aggregate sum, thus ascertaining the residuum or amount which would, under such marshaling of accounts, be left for *per capita* distribution among the Cherokees, emigrating under the treaty of 1835, excluding all extravagant and improper expenditures, and then allow to the "Old Settlers," or Western Cherokees, a sum equal to one-third part of said residuum, to be distributed *per capita* to each individual of said party of "Old Settlers" or Western Cherokees. It is further agreed that, so far as the Western Cherokees are concerned, in estimating the expense of removal and subsistence of an Eastern Cherokee, to be charged to the aggregate fund of five million six hundred thousand dollars above mentioned, the sums for removal and subsistence stipulated in the 8th article of the treaty of 1835, as commutation money in those cases in which the parties entitled to it removed themselves, shall be adopted. And as it affects the settlement with the Western Cherokees, there shall be no deduction from the fund above mentioned in consideration of any payments which may hereafter be made out of said fund; and it is hereby further understood and agreed that the principle above defined shall embrace all those Cherokees west of the Mississippi who emigrated prior to the treaty of 1835." (Rev. of Indian Treaties, pp. 81, 82.)

The investments and expenditures to be deducted from the $5,600,000 fund, as enumerated in article 15 of the treaty of 1835, are for improvements, ferries, claims for spoliations, removal, subsistence, debts and claims upon the Cherokee Nation, additional quantity of land, goods for the poorer class of Cherokees, and the several sums for the national fund.

By the fourth article of the supplementary articles to the treaty of 1835, the one hundred thousand dollars appropriated in the treaty of 1835 for the poorer class of Cherokees, was added to the permanent national fund of four hundred thousand dollars, thereby increasing it to five hundred thousand dollars.

In the settlement with the "Old Settlers," or Western Cherokees, under the treaty of 1846, the eighth article of the treaty of 1835, to which reference is therein made, fixed the amount for removal and subsistence to be charged to the aggregate fund at $53.33 *per capita*.

Adopting the construction placed upon the treaty of 1846 in the report of the Second Auditor and Second Comptroller of January 15, 1849, to the Senate, the Commissioner of Indian Affairs, on February 12, 1849, made the following statement of the account in question, for the information of the House Committee on Indian Affairs:

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"OLD SETTLERS" OR WESTERN CHEROKEES.

CR.

By consideration stipulated for the lands east of the Mississippi, ceded by the treaty of 1835–'36	$5,000,000 00	
By additional amount stipulated in third article of supplement thereto	600,000 00	
		$5,600,000 00

DR.

To amount for additional quantity of lands assigned Cherokees west	500,000 00	
To amount invested for general national funds	500,000 00	
To amount allowed for improvements and ferries, prior to date of treaty of 1846	1,716,502 85	
To amount for removal and subsistence, at $53.33 per head	941,979 99	
To amount paid citizens of the United States for claims against the Cherokee Nation	59,574 25	
To amount paid Cherokees for similar claims	17,561 41	
To amount paid Cherokee committee for their services	22,026 89	
To amount allowed prior to date of treaty of 1846, for spoliations, except for rents and dispossession of property and improvements	224,257 23	
		3,981,902 62
Residuum		1,618,097 38

(See House Mis. Doc. 43, p. 7, 30th Cong. 2d Sess.)

I am of the opinion that this statement sets forth all items that are properly chargeable to the aggregate fund, under a just and fair construction of the treaty governing the settlement with those Indians. But there is a manifest error in the *amount* of one item charged in the above account, namely, the item of "removal and subsistence at $53.33 per head, $941,979.99." The number of Cherokees removed and subsisted was about 13,149, according to Commissioner Medill's report of May 10, 1848 (Ex. Doc. 65, p. 17, H. R., 30th Cong. 1st sess.), and his estimate was probably as nearly correct as could be made. For the purpose of this settlement, I assume that the number so reported is correct, and thus find that the amount which should have been charged in the above account against the "Old Settlers" or Western Cherokees for removal and subsistence is $701,236.17 instead of $941,979.99, making an error against those Indians of $240,743.82. As corrected, the account would stand as follows:

Residuum	$1,618,097 38
By error on account of removal and subsistence	240,743 82
	$1,858,841 20

Of which the "Old Settlers" are entitled to one-third, viz, $619,613.73.

By the eleventh article of the treaty of 1846 it was stipulated that the question of "whether the Cherokee Nation shall be allowed interest on whatever sum may be found to be due the nation, and from what date and at what rate per annum," should be submitted to the Senate for its decision and final determination; and that body did, on the 5th day of September, 1850, decide and finally determine said questions in the language of the following resolution, namely:

"*Resolved*, That it is the sense of the Senate that interest at the rate of 5 per cent. per annum should be allowed upon the sums found due the Eastern and Western Cherokees, respectively, from the 12th day of June, 1838, upon the treaty of 1846." (See Congressional Globe, page 1760, first session, Thirty-first Congress.)

An act making appropriations for the current and contingent expenses of the Indian Department, and for fulfilling treaty stipulations with various Indian tribes, for the year ending June 30, 1851, approved September 30, 1850, appropriates "to the 'Old Settlers' or Western Cherokees, in full of all demands under the provisions of the treaty of sixth August, eighteen hundred and forty-six, according to the principles established in the fourth article thereof, five hundred and thirty-two thousand eight hundred and ninety-six dollars and ninety cents; and that the interest be allowed and paid upon the above sums due respectively to the Cherokees and 'Old Settlers,' in pursuance of the above-mentioned award of the Senate, under the reference contained in the said eleventh article of the treaty of sixth August, eighteen hundred and forty-six: *Provided*, That in no case shall any money hereby appropriated be paid to any agent of said Indians, or to any other person or persons than the Indian or Indians

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to whom it is due: *Provided, also,* That the Indians who shall receive the said money shall first respectively sign a receipt or release, acknowledging the same to be in full of all demands under the fourth article of said treaty." (Statutes at Large, vol. 9, p. 556.)

Against the receipt in full of all demands of the $532,896.90, with interest, so appropriated, the "Old Settlers" filed a "protest and appeal," with Colonel John Drennen, Superintendent of Indian Affairs, who was charged with the distribution of that money. This instrument was dated September 22, 1851, or at the time as therein stated that those Indians assembled under a notification to them given by Col. Drennen, "for the purpose of receiving their *per capita* or *head-right* money accruing under the stipulations of the treaty of 1846. In this protest they state that "urged by stern necessity which presses heavily upon them, they have mutually agreed to receive the amount appropriated for their benefit by the act of Congress approved September 30, 1850, and execute the receipt or release required by the *proviso* contained in said act. In doing so, however, they unite in most solemnly protesting against being thus arbitrarily and summarily deprived of the right to present a claim for a larger amount than has been awarded to them under the provisions of the treaty of August, 1846. They therefore enter this protest, and appeal to the justice of the United States Government, through the Superintendent of Indian Affairs, charged with the payment of their *per capita* money," &c. (Protest filed in this department.)

I think the doctrine will not be doubted, that a party in a case like the present may receive money or other property under protest, alleging that he has other or further rights, and thereby preserve those rights, though he execute a receipt in full of all demands; and be allowed, upon a proper showing, to establish the fact that the instrument did not express the receipt by him of all he was justly entitled to, and to show the circumstances which induced him to execute a receipt in full when it was for a less amount than what was due him.

It would seem, therefore, that the "Old Settler" or Western Cherokee Indians now have, under the treaties named, a just claim against the United States for the sum of $367,489.33 as shown by the following statement:

"Old Settler" or Western Cherokee Indians, Cr.

By amount due under Commissioner Medill's statement of February 12, 1849, as corrected on page 6 of this report	$619,613	73
By interest on above amount at 5 per cent. from June 12, 1838, to September 22, 1851, when payment of $532,896.90 with interest was made	411,354	66
	1,030,968	39
Deduct above payment with interest as credited	887,480	15
Balance due September 22, 1851	143,488	24
By interest on above balance from September 22, 1851, to December 12, 1882, at 5 per cent	224,001	09
Balance now due	367,489	33

Respecting the collection and distribution of the moneys due these Indians, it appears that, acting under the authority of that clause of the second article of the treaty of 1846 which provides that "all party distinctions shall cease, except so far as they may be necessary to carry out this convention or treaty," the "Old Settlers" held a convention or council November 22, 1875, at Tahlequah, the capital of the Cherokee Nation, for the consideration and determination of the best course to pursue and means to be adopted by them to secure a fair and just settlement with the United States of all matters under or growing out of said treaties. That convention resolved to prosecute their claim to a speedy, just, and final settlement and payment of what should upon such a settlement be found due them from the United States, and to that end appointed three of their own people as commissioners, with full power and authority to represent them in the prosecution of their claim. These commissioners were also authorized to employ such legal assistance as they might deem necessary to a successful prosecution of the claim, and for the purpose of defraying all the expenses of said prosecution the convention or council set apart and appropriated 35 per cent. of whatever sum might thus be recovered or secured to said Indians, "or so much thereof as might be necessary" for that purpose. A duly-attested copy of the proceedings of that convention is now on file in this department.

A similar council of these Indians was held at the same place on April 28, 1877, when J. M. Bryan, esq., one of their commissioners, was appointed their treasurer, and authorized to receive from and receipt to the proper officer or officers of the government for the 35 per cent. thus set apart for the purposes above stated. This authority conferred upon Mr. Bryan as their commissioner and treasurer was reaffirmed and continued by similar councils held at the same place November 20, 1880, Novem-

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ber 17, 1881, and October 13, 1882. By the resolutions of their council of November 17, 1881, the objects for which the sum of 35 per cent. was set apart and appropriated by the council of 1875 are specifically enumerated as follows, namely:

"To pay the expenses of the several councils held by their people for the purpose of considering and directing the collection of their claim from 1875 until the same should be collected and final payment and full settlement made with their treasurer. To repay moneys borrowed by the "Old Settlers" for the purpose of prosecuting their claim. To pay their commissioners for their services and expenses. To pay their treasurer for his services, and to pay attorneys employed by their commissioner and treasurer according to contracts with them for services actually rendered in the prosecution of their claim."

At the last council held by the Indians, on October 13, 1882, the following resolutions were unanimously adopted, viz: "Whereas we, the "Old Settler" or Western Cherokee Indians, have ever since about the year 1851 been appealing either to the Department of the Interior of the United States or Congress, praying for the settlement and payment of our claims arising against the general government growing out of the treaties between our people and the United States and the several acts of Congress in relation thereto: Therefore,

"1st. *Be it resolved by the "Old Settler" or Western Cherokee Indians in general council assembled*, That we fully and highly appreciate the action of Congress in inserting a provision in the bill making appropriations for sundry civil expenses of the government for the fiscal year ending June 30, 1883, and for other purposes, authorizing and directing the Hon. Secretary of the Interior to investigate and report to Congress what, in his opinion, would be an equitable settlement of all matters of dispute between any bands or parts of the Cherokee Indians and the United States, arising from or growing out of treaty stipulations or the laws of Congress relating thereto; and that, though our claims have been long deferred, we hereby express our thanks to Congress for thus providing for a just and equitable settlement with us.

"2nd. *Be it resolved*, That we respectfully but earnestly request that Congress, in making necessary appropriations to pay whatever amount may be found to be due us as such "Old Settler" or Western Cherokee Indians upon such investigation and report by the Hon. Secretary of the Interior, shall direct the payment of the same to be made in accordance with the resolution for that purpose adopted by the general council of the said "Old Settler" or Western Cherokee Indians on the 22d of November, 1875, and which has been reaffirmed by said Indians by like general councils held respectively in 1876, 1877, 1879, 1880, 1881, and which we do hereby again reaffirm, and ask that the per cent. therein named be paid to Col. J. M. Bryan, our special commissioner to prosecute our said claims, and our treasurer, to be applied by him as stipulated and provided in said resolution of November 22, 1875, and that the said J. M. Bryan be, and he is hereby, authorized and fully empowered to receive from the proper disbursing officer or officers of the United States the amount of said per cent. upon whatever sum may be allowed said Indians and appropriated by Congress as aforesaid, and to execute a receipt in full therefor to the United States for and on behalf of all of said "Old Settler" or Western Cherokee Indians, and that the balance of such amount so found due and to be distributed *per capita* to each and every "Old Settler" or Western Cherokee Indian according to the fourth article of the treaty of 1846: *Provided*, That before the said J. M. Bryan, treasurer and commissioner of the "Old Settler" Cherokees draws the amount of (35 per cent.) 35 per cent. as above provided, he shall be required to file a bond to the satisfaction of the Secretary of the Interior, conditioned upon disbursing the said money according to the authority granted him by the "Old Settlers'" conventions of 1875 to 1882, inclusive."

Duly certified copies of the proceedings of the several councils, as above mentioned, are now on file in the Interior Department.

Therefore, in view of all the facts stated in this report, I recommend that an appropriation be made to pay the said sum of $367,489.33, so found due the "Old Settler" or Western Cherokee Indians, and that the same be paid in accordance with their request, as expressed by them in their several resolutions above mentioned and the fourth article of the treaty of 1846.

Very respectfully,

C. C. CLEMENTS,
Special Agent.

The Hon. the SECRETARY OF THE INTERIOR.

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[Senate Report No. 353. Forty-seventh Congress, first session.]

MARCH 29, 1882.—Ordered to be printed.

Mr. CAMERON, of Wisconsin, from the Committee on Indian Affairs, submitted the following report, to accompany bill S. 321:

The Committee on Indian Affairs, to whom was referred the bill (S. 321) to refer the claim of the Western Cherokees, or "Old Settlers," to the United States Court of Claims for adjudication, have considered the same, and report thereon as follows:

A bill, of which this is a copy, was considered by the Senate Committee on Indian Affairs at the last session of Congress, and it was reported favorably from that committee by Senator Logan.

The report made by Senator Logan was as follows, viz:

"It appears from the papers submitted to us that the claim presented by the memorial is based upon the stipulations contained in treaties between these Indians and the United States, dated respectively in the years of 1835, 1836, and 1846. The 'Old Settlers or Western Cherokee Indians,' so called, consist of that portion of the Cherokee Indians who emigrated, at an early day in this country's history, west of the Mississippi River. Indeed, many of them emigrated to that country while it belonged to France, and after the United States had acquired that territory, President Jefferson encouraged these Indians to emigrate there, by his letter of January 9, 1809. Between that date and the year of 1817, so large a number of the Cherokees had emigrated to and settled upon lands west of the Mississippi that they assumed a national or tribal character, and in July of the latter year a treaty was entered into between General Andrew Jackson, Governor Joseph McMinn, and General David Meriwether, as commissioners on the part of the United States, and deputies from the Cherokee Indians east, and those west of the Mississippi River, in what is now the State of Arkansas. By this treaty the *final division* of the tribe, previously agreed upon, was consummated. It was stipulated in the 3d, 4th, and 5th articles that they should thereafter hold their property separately, under the names of the 'Cherokee Nation east of the Mississippi River' and the 'Cherokee Nation west of the Mississippi River.' By the terms of that treaty, in consideration of lands ceded by the Western Cherokees to the United States east of the Mississippi River, the United States bound themselves 'to give to that part of the Cherokee Nation on the Arkansas River as much land on said river and White River as they had or might thereafter receive from the Cherokee Nation east of the Mississippi, acre for acre, as the just portion due that part of the nation on the Arkansas River, agreeably to their numbers'; the boundaries of which were described by the 5th article.

"That the treaty of 1817 was concluded to carry into effect in an efficient and binding manner the arrangement agreed upon in 1808–'09, is clearly shown in its preamble. At the time of making that treaty, the Cherokees on the Arkansas did not exceed two thousand souls, and in order to ascertain what number intended to emigrate and join the Western Nation, the 3d article of the treaty provided 'that a census shall be taken of the whole Cherokee Nation during the month of June, 1818,' in the following manner, viz: that 'the census of those on the east side of the Mississippi River who declare their intention of removing, shall be taken by a commissioner *appointed by the Cherokees on the Arkansas River;* and the census of the Cherokees on the Arkansas River, and those removing there, and who at that time declared their intention of removing there, shall be taken by a commissioner appointed by the President of the United States, and one appointed by the Cherokees east of the Mississippi River.'

"We have been thus particular in referring to the treaty of 1817, as it is the first official or binding compact entered into between the United States and the Cherokees for the establishment of a *nation* west of the Mississippi. It appears manifest from a careful examination of this instrument that two *nations of Cherokees* were established. Thus that part of the Cherokees who decided to become part of the Cherokees on the Arkansas ceded their portion of the Cherokee lands east of the Mississippi River in exchange for lands west of that river, acre for acre. Not one dollar was paid them. By this treaty the separation of the tribe of Cherokees, and a division of their *common property*, was put in legal form. The stipulation that a census should be taken of all who had emigrated or intended to remove west and become citizens of the western nation clearly shows that the 'country on the Arkansas' was not intended to be given to the *whole nation*, but to *that portion* of it who had arrived there, or who would express their intention of removing there on or before a certain day. It was then agreed that the common *property* of the whole should be equitably divided and thereafter held separately. This treaty it seems was looked upon as the groundwork of the future removal of the Indian population from the South and Southwestern States be-

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yond the Mississippi, and every means were used by the government to induce emigration under its provisions.

"Afterwards the Hon. John C. Calhoun, then Secretary of War, entered into a convention with those delegates, by which a new treaty with the Eastern Cherokees was concluded February 27, 1819. In this treaty or convention the Western Cherokees were not represented. It was negotiated and concluded between the United States and the Eastern Cherokees exclusively; but by its terms the separate and independent character and rights of the Western Cherokees were distinctly recognized and preserved.

"The 6th article of this treaty specially stipulates and defines the separate and relative rights of the two nations of Cherokees. It provides that 'the contracting parties agree that the annuity of the Cherokee Nation shall be paid, *two-thirds* to the Cherokees east of the Mississippi and *one-third* to the Cherokees west of that river, as it is estimated that those who have emigrated and have enrolled for emigration constitute *one-third* of the whole nation.'

"Here is a clear and unequivocal declaration made by the United States and the Cherokees east, that there was at that time *a nation* of Cherokees west of Mississippi: that the property they formerly held *in common* was *divided*.

"The Western or 'Old Settler' Cherokees consented to the stipulations of this latter treaty so far as the same related to them and their property rights.

"The territory assigned and conveyed to them in Arkansas was surveyed and marked off, embracing about four million two hundred thousand acres, with the pledge from the Government of the United States that the lands *west of their western boundary* should be attached thereto as soon as they could be purchased from the aboriginal occupants. The annuities were thereafter divided as agreed upon, viz, *one-third* paid to the Cherokee Nation west, and *two-thirds* to the Cherokee Nation east of the Mississippi River. They had separate agents appointed by the United States, and from that time were treated as separate and distinct nations, each holding its own property.

"In the year of 1828 the government, desiring to extinguish the title of the Western Cherokees to their lands in what is now the State of Arkansas, entered into another treaty with them for that purpose. By the 2d article of that treaty the United States solemnly guaranteed to that nation of Indians 7,000,000 acres of land west of the western boundary of Arkansas, the boundaries of which are specifically defined by that article. The same article further guaranteed to those Indians as follows: 'In addition to the *seven millions of acres* thus provided for and bounded, the United States further *guarantee* to the Cherokee Nation a perpetual outlet west, and a free and unmolested use of all the country lying west of the western boundary of the above-described limits, and as far west as the sovereignty of the United States and their right of soil extends.' So it will be seen that the title to the lands embraced and described in the 2d article of the treaty of 1828, in the Old Settler or Western Cherokees, was solemnly confirmed by the United States.

"This same guarantee is contained in the 1st article of the treaty with them in the year of 1833, with some slight and unimportant changes in the boundaries.

"The views of the committee in regard to the rights of the Western Cherokees, acquired under the treaties of 1817, 1819, and 1828, are sustained by the correspondence between the contracting parties to them, to be found among the documents on that subject in the Executive and War Departments anterior to the treaty of 1835, as well as the preambles to the treaties of 1828 and 1833, between the United States and the Western Cherokees; all of which show that the treaty of 1819 was regarded by all parties as a final measure, and that thereafter the Eastern and Western Cherokees were to be separate nations entirely independent of each other.

"Thus the separate nationality of the Western Cherokees, and their exclusive title to their lands referred to, stood until 1835, when the treaty of that year was concluded between the United States and the Cherokee Indians.

"By the first article of this latter treaty the Cherokees, in consideration of the sum of five million dollars, ceded, relinquished, and conveyed to the United States all their lands east of the Mississippi River, and released all their claims upon the United States for spoliations of every kind.

"The second article of this treaty makes the first attempt to deprive the Western Cherokees of their absolute right as a separate part of the Cherokees to the lands guaranteed to them by the treaty of 1828, and reaffirmed by the treaty of 1833, and it will be observed that only two of the Western Cherokees signed this treaty, namely, John Smith and James Rogers, who, it will be seen by reference to the statement prefixed to their signatures to the treaty of 1835, were only visitors from the Western Cherokees to the Cherokees east of the Mississippi, to give assurance of the friendly disposition of their people towards the Eastern Cherokees, &c., and not as delegates of the Western Cherokees authorized to negotiate and sign treaties.

"It will also be seen by reference to the report of Mr. Medill, Commissioner of Indian Affairs (Ex. Doc. 65, page 15, first session Thirtieth Congress), that in the set-

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tlement made with the Eastern Cherokees they are charged with the sum of $1,500 '*paid to John Smith and James Rogers, delegates from the Western Cherokees, present at the negotiation of treaty of* 1835–'36 *for their trouble and expenses.*' This payment would seem to have been made as an inducement to Smith and Rogers to sign that treaty, because there is no other item charged against the Eastern Cherokees to pay for the trouble and expenses of any other of the delegates that negotiated that treaty. By the terms of the treaty of 1835 the Eastern Cherokees were to be removed west of the Mississippi River and settled upon the land formerly granted and guaranteed to the Western Cherokees.

"Under the fifteenth article of this treaty there was authorized to be deducted from the fund due these Indians 'the amount which shall be actually expended for the payment for improvements, ferries, claims, for spoliations, removal, and subsistence, and debts and claims upon the Cherokee Nation, and for additional quantity of land, and goods for the poorer of Cherokees, and the several sums to be invested for the general national funds provided for in the several articles of that treaty. The balance, whatever the same may be, shall be equally divided between all the people belonging to the Cherokee Nation East, according to the census just completed, and such Cherokees as have removed west since June, 1833.'

"By the second article of the supplement to this latter treaty it is provided and declared 'that the sum of five millions of dollars fixed by the Senate in their resolution of —— day of March, 1835, as the value of the Cherokee lands and possessions east of the Mississippi River was not intended to include the amount which may be required to remove them, nor the value of certain claims which many of their people had against the United States.'

"The third article of the supplement to that treaty allows these Indians the sum of $600,000, to meet the foregoing items, and the balance of this latter sum, that 'may remain after removal and payment of the claims so ascertained shall be turned over and belong to the educational fund.'

"After concluding the last-named treaty and the supplement thereto it seems that serious difficulties arose between portions of the people constituting and organized as the Cherokee Nation of Indians, growing out of charges to be made against the Western Cherokees, and to be deducted from the $5,000,000 fund, as the purchase of their lands east of the Mississippi River, under the treaty of 1835. To settle these difficulties and to bring about a final and amicable settlement of all these causes of differences the treaty of August 6, 1846, was entered into between both the Eastern and Western Cherokees and the United States.

"By the first article of this treaty all the lands formerly granted to and held and occupied by the Western Cherokees were to be occupied and enjoyed by all the Cherokees in common.

"And, to settle and have definitely understood what claims or charges that should, and what should not, be made against the $5,000,000 fund (the proceeds of the sale of their land east), the third article of this latter treaty provides that—

"'Whereas certain claims have been allowed by the several boards of commissioners heretofore appointed under the treaty of 1835 *for rents under the name of improvements and spoliations, and for property of which the Indians were dispossessed, provided for under the 16th article of the treaty of* 1835; and whereas the said claims have been paid out of the $5,000,000 fund; and whereas said claims *were not justly chargeable to that fund* but were to be paid by the United States, the said United States agree to reimburse the said fund *the amount thus charged to said fund*—and the same shall form a part of the aggregate amount to be distributed to the Cherokee people—as provided in the 9th article of this treaty; and whereas a further amount has been allowed *for reservations under the provisions of the 13th article of the treaty of* 1835 by said commissioners, and has been paid out of said fund, and which said sums were properly chargeable to, and should have been paid by, *the United States:* the said United States further agree to reimburse the amounts thus paid for reservations to said fund; and whereas the expenses of making the treaty of New Echota *were also paid out of said fund, when they should have been borne by the United States:* The United States agree to reimburse the same, and also to reimburse all other sums paid to any other agent of the government and improperly charged to said fund, and the same shall form a part of the aggregate amount to be distributed to the Cherokee people as provided for in the 9th article of this treaty.'

"By the fourth article of the last-named treaty the Old Settler or Western Cherokees became entitled to one-third of the proceeds of the Cherokee lands east of the Mississippi River, freed from the charges mentioned in and specially excepted as charges to be made by the third article of that treaty.

"The terms 'excluding all extravagant and improper expenditures,' contained in the fourth article, evidently meant the items specified in the third article, which declares that the items therein mentioned should not be chargeable to the $5,000,000 fund, but be borne by the United States. It is provided by the fourth article that 'so far as the Western Cherokees are concerned, in estimating the expense of removal

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and subsistence of an Eastern Cherokee, to be charged to the aggregate fund of five millions six hundred thousand dollars above mentioned, the sums for removal and subsistence stipulated in the eighth article of the treaty of 1835, as commutation money in those cases in which the parties entitled to it removed themselves, shall be adopted.'

"The eighth article of the treaty of 1835 fixes those sums at $53.33 per head.

"The fourth article of the treaty of 1846 further provides that so far as the settlement with the Western Cherokees is concerned, 'there shall be no deduction from the fund before mentioned in consideration of any payments which may hereafter be made out of said fund; and it is hereby further understood and agreed that the principle above defined shall embrace all of those Cherokees west of the Mississippi who emigrated prior to the treaty of 1835.'

"This article and the third article of the treaty of 1846 define the basis of the settlement to be made with the Old Settlers or Western Cherokees, and fixes the sum from which the charges proper to be made against them shall be deducted at $5,600,000.

"The ninth article of this treaty fixes the basis of settlement with the Eastern Cherokees, and the sum from which charges against them shall be deducted, at $6,647,067.

"The eleventh and only remaining article of the treaty of 1846, affecting the claim of the Western Cherokees, provides as follows:

"'Whereas the Cherokee delegates contend that the amount expended for one year's subsistence of the Eastern Cherokees after their arrival in the west is not properly chargeable to the treaty fund: it is hereby agreed that the question shall be submitted to the Senate of the United States for its decision, which shall decide whether the subsistence shall be borne by the United States or the Cherokee fund, and if by the Cherokees, then to say whether the subsistence shall be charged at a greater rate than thirty-three, thirty-three one-hundredths dollars per head; and also the question whether the Cherokee Nation shall be allowed interest on whatever sum may be found to be due the nation, and from what date and at what rate per annum.'

"The twelfth article of this treaty was stricken out by the Senate upon the ratification of the treaty, which was assented to by the Cherokees.

"The questions submitted to the Senate of the United States by the eleventh article were settled by the Senate, and thereby became a part of the treaty stipulations by the adoption of the following resolutions, September 5, 1850 (Cong. Globe, vol. 21, part 2, 1849–'50, page 1760):

"'*Resolved by the Senate of the United States*, That the Cherokee Nation of Indians are entitled to the sum of $189,422.76 for subsistence, being the difference between the amount actually paid and that expended by the United States, and which excess was improperly charged to the "treaty fund" in the report of the accounting officer of the Treasury.

"'*Resolved*, That it is the sense of the Senate that interest at the rate 5 per cent. per annum should be allowed upon the sums found due the Eastern and Western Cherokees, respectively, from the 12th day of June, 1838, upon the treaty of 1846.'

"By the second of the above resolutions it was declared that the Cherokees were entitled to interest upon any sums due them under the treaties of 1835 and 1846, from the 12th day of June, 1838.

"The committee find that among the items of the claim of the Western Cherokees there is one that is a manifest error in settling with these Indians, namely, the item of 'removal and subsistence, at the rate of $53.33 per head, $909,313.34,' found on page 19, Report of the Commissioner of Indian Affairs, Ex. Doc. 65, 1st session 30th Congress. This item in the Commissioner's statement of the account does not state the number of Indians removed and subsisted at that rate, but on page 17 of that report the number is stated at $13,149. That number at the rate of $53.33 per head would amount to the sum of $701,236, instead of $909,313.34, as charged, making an error against the Western Cherokees of $208,077.34 in the simple matter of calculation.

"Besides this item, these Indians claim that by a fair construction of the treaties with them, and the acts of Congress relating to their rights under these treaties, they should not be charged, as was done by the accounting officers of the government, in their settlements, with the items—

"First. The charge for claims of citizens of the United States of $59,574.25.

"Second. The charge for claims of individual Cherokees, $17,561.41.

"Third. The charge for compensation to Cherokee committee, $22,026.89.

"Fourth. The charge for spoliation, rents, and damages, $434,861.85.

"Fifth. The charge for reservations, allowed, $116,882.50.

"Sixth. The charge for pre-emptions, $15,5-9.

"Seventh. The charge for and on account of removal and subsistence, $32,666.65.

"There is a peculiarity about the last of the above items that throws some doubt around its correctness, for the cost of subsistence and removal to be borne by the Western Cherokees, as above shown, had not only been charged to them, but over-

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charged, and the fact that it took just this latter sum to effect a balance of the account with these Indians seems to furnish the reason for the doubt about the correctness of this last item.

"The claimants contend, and the committee are of opinion, that the receipt by these Indians of the sum of $523,782.18, appropriated by the act of September 30, 1850, in the manner in which they received it, does not preclude them from making their claim for any other sum that may be justly due them under a fair and proper interpretation of the treaties with them. Though the act making that appropriation provides 'that the Indians who shall receive the said money shall first respectively sign a receipt or release acknowledging the same to be in full of all demands under the fourth article of said treaty,' it appears that before these Indians would consent to receive the said sum thus appropriated they were assured by the agent of the government sent to make the payments, Mr. John Drennon, that they could receive the money under protest and thereby preserve their rights under the treaties between them and the United States for any amounts that might be due them by a just and equitable construction of said treaties.

"It also appears that these Indians, before receiving any part of that appropriation, did formally and in writing deliver to said agent their solemn protest against receiving the same as a full settlement of all their claims against the United States under said treaties, which protest, as appears by the records of the Interior Department, was forwarded to the Commissioner of Indian Affairs at Washington City.

"The facts necessary to determine the justness of the claim preferred by these Indians consist almost, if not entirely, of the public treaties, proceedings of the Senate, acts of Congress, and the records of the several departments of the government, all of which are preserved.

"The committee are of opinion that the claim of these Indians possesses sufficient merit to demand a careful and thorough investigation of the same; that such an investigation involves a judicial interpretation of the several treaties between them and the United States, the construction of the several acts of Congress in relation thereto, and the examination of all settlements made and accounts stated with them under these treaties and acts of Congress; that such an investigation cannot be made by a committee of Congress in the limited time allowed such committee by the performance of the ordinary legislative duty imposed upon its members; and that this case should receive a full investigation by the courts.

"The committee therefore report the accompanying bill, and recommend its passage.

"*Copy of proceedings of the council of the Old Settler or Western Cherokee Indians, November* 30, 1880.

"TALEQUAH, CHEROKEE NATION, *November* 20, 1880.

"At a meeting of the Old Settler Cherokees, held in the council room of the capital, there were present Rev. W. A. Duncan, Mr. J. M. Bryan, H. D. Reese, W. C. Woodall, D. C. Duncan, Caleb Starr, Wm. McCracken, J. M. Smith, and John Hendricks. George Drum, B. H. Severe, Simon Girty, George Critenton, Charles Johnson, L. C. Woodall, Wm. Hendricks, members of council; J. M. Duncan and other old settlers.

"W. A. Duncan was called to preside, and H. D. Reese appointed secretary.

"Mr. J. M. Bryan was requested to make his report as to the present status of the claim for which he is agent, &c.

"Mr. Bryan made his report to the meeting, and made known that the said claim of the Old Settlers against the United States was now before the Indian Committee of the Senate, and that for various causes has been delayed to be reported to the Senate.

"Report was interpreted and adopted. It was moved and seconded that a committee be appointed by the chair to report resolutions reiterating the powers granted Mr. Bryan by a former meeting. Adopted.

"The chair appointed Messrs. H. D. Reese, W. C. Woodall, and John Hendricks said committee, who submitted the following, to wit:

"To the Old Settler Council now in session:

"*Whereas*, According to notice published in the Cherokee Advocate by J. M. Bryan, William Wilson, and William Hendricks, our commissioners appointed in 1875 to prosecute the 'Old Settler' Cherokee claim against the Government of the United States for balances due said 'Old Settler' Cherokees, as provided for mainly by Cherokee treaty of 1846; and

"*Whereas*, Our said commissioners in their reports have given general satisfaction up to the time of the present council: Therefore,

"*Resolved*, That we this day ratify and confirm all the action taken in the premises.

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by our said commissioners, and hereby confirm all contracts made with attorneys by our said commissioners for the services rendered in the prosecution of our said claim.

"*Be it further resolved*, That J. M. Bryan, our special commissioner and attorney, who is himself a citizen of the Cherokee Nation and an 'Old Settler,' and by our former council was duly made treasurer for the amount of 35 per cent. of the amount of the claim that may be allowed. The first council treating said commission was in 1875, at which council 35 per cent. of the whole claim was set apart to pay the expense of former Old Settlers councils, to pay the expenses of our commissioners, to pay the expenses of attorneys employed to help prosecute said claim, or as much thereof as might be necessary.

"Therefore, we again reiterate that J. M. Bryan is fully authorized to receive the said amount of 35 per cent. of the whole amount allowed on said claim, as the 'Old Settler' Cherokee treasurer, and to receipt to the proper authorities of the United States for said amount, which shall be the 'Old Settler' Cherokees' receipt for the same.

"Submitted by—

"H. D. REESE,
"W. C. WOODALL,
"JOHN HENDRICKS,
"*Committee.*

"The above resolution being interpreted and put to vote, was unanimously adopted.

"W. A. DUNCAN,
"*President.*

"H. D. REESE,
"*Secretary.*

"I hereby certify that the above is a true copy of the proceedings had by the 'Old Settlers' council.

"Given under my hand and seal of office, at Tahlequah, Cherokee Nation, I. T., this 23d day of November, 1880.

"ALLEN ROSS, *Clerk*,
"*Tahlequah Dist., C. N., I. T.*

"Approved November 26, 1880.

"D. W. BUSHYHEAD,
"*Principal Chief, Cherokee Nation.*

"I hereby certify that this is a true copy of the original.

"DELOZIER DAVIDSON,
"*Notary Public.*

"WASHINGTON, D. C., *January* 3, 1881."

Your committee concur in and adopt this report, and report back the bill with the recommendation that it do pass.

[Senate Report No. 849, Forty-sixth Congress, third session.]

FEBRUARY 9, 1881.—Ordered to be printed.

Mr. LOGAN, from the Committee on Indian Affairs, submitted the following report [to accompany bill S. 2164]:

The Committee on Indian Affairs, to whom was referred the memorial of the "Old Settlers or Western Cherokee Indians," have had the same under consideration, and submit the following report thereon:

It appears from the papers submitted to us that the claim presented by the memorial is based upon the stipulations contained in treaties between these Indians and the United States, dated respectively in the years of 1835, 1836, and 1846. The "Old Settlers or Western Cherokee Indians," so called, consist of that portion of the Cherokee Indians who emigrated at an early day in this country's history west of the Mississippi River. Indeed, many of them emigrated to that country while it belonged to France, and after the United States had acquired that territory President Jefferson encouraged these Indians to emigrate there by his letter of January 9, 1809. Between that date and the year of 1817 so large a number of the Cherokees had emigrated to and settled upon lands west of the Mississippi that they assumed a national or tribal character, and in July of the latter year a treaty was entered into between General Andrew Jackson, Governor Joseph McMinn, and General David Merriweather, as commissioners on the part of the United States, and deputies from the Cherokee Indians east, and those west of the Mississippi River, in

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hat is now the State of Arkansas. By this treaty the *final division* of the tribe, previously agreed upon, was consummated. It was stipulated in the 3d, 4th, and 5th rticles that they should thereafter hold their property separately, under the names f the "Cherokee Nation east of the Mississippi River" and the "Cherokee Nation west f the Mississippi River." By the terms of that treaty, in consideration of lands eded by the Western Cherokees to the United States east of the Mississippi River, he United States bound themselves "to give to that part of the Cherokee Nation on he Arkansas River as much land on said river and White River as they had or might hereafter receive from the Cherokee Nation east of the Mississippi, acre for acre, as he just portion due that part of the nation on the Arkansas River, agreeably to their umbers;" the boundaries of which were described by the 5th article.

That the treaty of 1817 was concluded to carry into effect in an efficient and binding manner the arrangement agreed upon in 1808–'09 is clearly shown in its preamble. At the time of making that treaty the Cherokees on the Arkansas did not exceed wo thousand souls, and in order to ascertain what number intended to emigrate nd join the Western Nation, the 3d article of the treaty provided "that a census hall be taken of the whole Cherokee Nation during the month of June, 1818," in the ollowing manner, viz, that "the census of those on the east side of the Mississippi River who declare their intention of removing shall be taken by a commissioner *appointed by the Cherokees on the Arkansas River;* and the census of the Cherokees on the Arkansas River, and those removing there, and who at that time declared their intention of removing there, shall be taken by a commissioner appointed by the President of the United States and one appointed by the Cherokees east of the Mississippi River."

We have been thus particular in referring to the treaty of 1817, as it is the first official or binding compact entered into between the United States and the Cherokees for the establishment of a *nation* west of the Mississippi. It appears manifest from a careful examination of this instrument that two *nations of Cherokees* were established. Thus that part of the Cherokees who decided to become part of the Cherokees on the Arkansas ceded their portion of the Cherokee lands east of the Mississippi River in exchange for lands west of that river, acre for acre; not one dollar was paid them. By this treaty the separation of the tribe of Cherokees and a division of their *common property* was put in legal form. The stipulation that a census should be taken of all who had emigrated or intended to remove west and become citizens of the Western Nation clearly shows that the "country on the Arkansas" was not intended to be given to the *whole nation*, but to *that portion* of it who had arrived there, or who would express their intention of removing there on or before a certain day; it was then agreed that the common *property* of the whole should be equitably divided and hereafter held separately. This treaty, it seems, was looked upon as the groundwork of the future removal of the Indian population from the South and Southwestern States beyond the Mississippi, and every means were used by the government to induce emigration under its provisions.

Afterwards the Hon. John C. Calhoun, then Secretary of War, entered into a convention with those delegates, by which a new treaty with the Eastern Cherokees was concluded February 27, 1819. In this treaty or convention the Western Cherokees were not represented. It was negotiated and concluded between the United States and the Eastern Cherokees exclusively; but by its terms the separate and independent character and rights of the Western Cherokees were distinctly recognized and preserved.

The 6th article of this treaty specially stipulates and defines the separate and relative rights of the two nations of Cherokees. It provides that "the contracting parties agree that the annuity of the Cherokee Nation shall be paid, *two-thirds* to the Cherokees east of the Mississippi and *one-third* to the Cherokees west of that river, as it is estimated that those who have emigrated and have enrolled for emigration constitute *one-third* of the whole nation."

Here is a clear and unequivocal declaration made by the United States and the Cherokees east that there was at that time *a nation* of Cherokees west of the Mississippi; that the property they formerly held in *common* was *divided*.

The Western or "Old Settler" Cherokees consented to the stipulations of this latter treaty so far as the same related to them and their property rights.

The territory assigned and conveyed to them in Arkansas was surveyed and marked off, embracing about four million two hundred thousand acres, with the pledge from the Government of the United States that the lands *west of their western boundary* should be attached thereto as soon as they could be purchased from the aboriginal occupants. The annuities were thereafter divided as agreed upon, viz, *one-third* paid to the Cherokee Nation west, and *two-thirds* to the Cherokee Nation east of the Mississippi River. They had separate agents appointed by the United States, and from that time were treated as separate and distinct nations, each holding its own property.

In the year 1828 the government, desiring to extinguish the title of the Western Cherokees to their lands in what is now the State of Arkansas, entered into another

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treaty with them for that purpose. By the 2d article of that treaty the United States solemnly guaranteed to that nation of Indians 7,000,000 acres of land west of the western boundary of Arkansas, the boundaries of which are specifically defined by that article. The same article further guaranteed to these Indians as follows: "In addition to the *seven millions of acres* thus provided for and bounded, the United States further *guarantee* to the Cherokee Nation a perpetual outlet west, and a free and unmolested use of all the country lying west of the western boundary of the above-described limits, and as far west as the sovereignty of the United States and their right of soil extends." So it will be seen that the title to the lands embraced and described in the 2d article of the treaty of 1828, in the Old Settler or Western Cherokees, was solemnly confirmed by the United States.

This same guarantee is contained in the 1st article of the treaty with them in the year of 1833, with some slight and unimportant changes in the boundaries.

The views of the committee in regard to the rights of the Western Cherokees, acquired under the treaties of 1817, 1819, and 1828, are sustained by the correspondence between the contracting parties to them, to be found among the documents on that subject in the Executive and War Departments anterior to the treaty of 1835, as well as the preambles to the treaties of 1828 and 1833, between the United States and the Western Cherokees; all of which show that the treaty of 1819 was regarded by all parties as a final measure, and that thereafter the Eastern and Western Cherokees were to be separate nations entirely independent of each other.

Thus the separate nationality of the Western Cherokees, and their exclusive title to their lands referred to, stood until 1835, when the treaty of that year was concluded between the United States and the Cherokee Indians.

By the first article of this latter treaty the Cherokees, in consideration of the sum of five million dollars, ceded, relinquished, and conveyed to the United States all their lands east of the Mississippi River, and released all their claims upon the United States for spoliations of every kind.

The second article of this treaty makes the first attempt to deprive the Western Cherokees of their absolute right as a separate part of the Cherokees to the lands guaranteed to them by the treaty of 1828, and reaffirmed by the treaty of 1833, and it will be observed that only two of the Western Cherokees signed this treaty, namely, John Smith and James Rogers, who, it will be seen by reference to the statement prefixed to their signatures to the treaty of 1835, were only visitors from the Western Cherokees to the Cherokees east of the Mississippi, to give assurance of the friendly disposition of their people towards the Eastern Cherokees, &c., and not as delegates of the Western Cherokees authorized to negotiate and sign treaties.

It will be seen by reference to the report of Mr. Medill, Commissioner of Indian Affairs (Ex. Doc. 65, page 15, 1st session, 30th Congress), that in the settlement made with the Eastern Cherokees they are charged with the sum of $1,500 "*paid to John Smith and James Rogers, delegates from the Western Cherokees, present at the negotiation of the treaty of* 1835–'36, *for their trouble and expenses.*" This payment would seem to have been made as an inducement to Smith and Rogers to sign that treaty, because there is no other item charged against the Eastern Cherokees to pay for the trouble and expenses of any others of the delegates that negotiated that treaty. By the terms of the treaty of 1835 the Eastern Cherokees were to be removed west of the Mississippi River and settled upon the land formerly granted and guaranteed to the Western Cherokees.

Under the 15th article of this treaty there was authorized to be deducted from the fund due these Indians "the amount which shall be actually expended for the payment for improvements, ferries, claims for spoliations, removal, and subsistence, and debts and claims upon the Cherokee Nation, and for additional quantity of land, and goods for the poorer of Cherokees, and the several sums to be invested for the general national funds provided for in the several articles of that treaty. The balance, whatever the same may be, shall be equally divided between all the people belonging to the Cherokee Nation east, according to the census just completed, and such Cherokees as have removed west since June, 1833."

By the second article of the supplement to this latter treaty it is provided and declared "that the sum of five millions of dollars fixed by the Senate in their resolution of —— day of March, 1835, as the value of the Cherokee lands and possessions east of the Mississippi River was not intended to include the amount which may be required to remove them, nor the value of certain claims which many of their people had against the United States."

The third article of the supplement to that treaty allows these Indians the sum of $600,000, to meet the foregoing items, and the balance of this latter sum, that "may remain after removal and payment of the claims so ascertained shall be turned over and belong to the educational fund."

After concluding the last-named treaty and the supplement thereto it seems that serious difficulties arose between portions of the people constituting and organized as the Cherokee Nation of Indians, growing out of charges to be made against the Western Cherokees, and to be deducted from the $5,000,000 fund, as the purchase of their

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nds east of the Mississippi River, under the treaty of 1835. To settle these difficul-ies and to bring about a final and amicable settlement of all these causes of differences he treaty of August 6, 1846, was entered into between both the Eastern and Western herokees and the United States.

By the first article of this treaty all the lands formerly granted to and held and oc-upied by the "Western Cherokees" were to be occupied and enjoyed by all the Cher-kees in common.

And, to settle and have definitely understood what claims or charges that should, nd what should not, be made against the $5,000,000 fund (the proceeds of the sale of heir land east), the third article of this latter treaty provides that—

"Whereas certain claims have been allowed by the several boards of commissioners ereto fore appointed under the treaty of 1835 *for rents under the name of improvements nd spoliations, and for property of which the Indians were dispossessed, provided for under he 16th article of the treaty of* 1835; and whereas the said claims have been paid out f the $5,000,000 fund; and whereas said claims *were not justly chargeable to that fund,* ut were to be paid by the United States, the said United States agree to reimburse he said fund *the amount thus charged to said fund*—and the same shall form a part of the ggregate amount to be distributed to the Cherokee people—as provided in the 9th rticle of this treaty; and whereas a further amount has been allowed *for reservations nder the provisions of the 13th article of the treaty of* 1835 by said commissioners, and as been paid out of said fund, and which said sums were properly chargeable to, and hould have been paid by, *the United States:* the said United States further agree to eimburse the amounts thus paid for reservations to said fund; and whereas the ex-enses of making the treaty of New Echota *were also paid out of said fund, when they hould have been borne by the United States:* the United States agree to reimburse the ame, and also to reimburse all other sums paid to any other agent of the government nd improperly charged to said fund, and the same shall form a part of the aggregate mount to be distributed to the Cherokee people as provided for in the 9th article of his treaty."

By the 4th article of the last-named treaty the old settlers or Western Cherokees ecame entitled to one-third of the proceeds of the Cherokee lands east of the Missis-ippi River, freed from the charges mentioned in and specially excepted as charges to e made by the 3d article of that treaty.

The terms "excluding all extravagant and improper expenditures," contained in the th article, evidently meant the items specified in the 3d article, which declares that he items therein mentioned should not be chargeable to the $5,000,000 fund, but be orne by the United States. It is provided by the 4th article that "so far as the West-rn Cherokees are concerned, in estimating the expense of removal and subsistence of n Eastern Cherokee, to be charged to the aggregate fund of five millions six hundred housand dollars above mentioned, the sums for removal and subsistence stipulated n the 8th article of the treaty of 1835, as commutation money in those cases in which he parties entitled to it removed themselves, shall be adopted."

The 8th article of the treaty of 1835 fixes those sums at $53.33 per head.

The 4th article of the treaty of 1846 further provides that, so far as the settle-ment with the Western Cherokees is concerned, "there shall be no deduction from he fund before mentioned in consideration of any payments which may hereafter be ade out of said fund; and it is hereby further understood and agreed that the prin-iple above defined shall embrace all of those Cherokees west of the Mississippi who migrated prior to the treaty of 1835."

This article and the 3d article of the treaty of 1846 defines the basis of the settle-ment to be made with the old settlers or Western Cherokees, and fixes the sum from hich the charges proper to be made against them shall be deducted at $5,600,000.

The 9th article of this treaty fixes the basis of settlement with the Eastern Chero-ees, and the sum from which charges against them shall be deducted, at $6,647,067.

The 11th and only remaining article of the treaty of 1846, affecting the claim of he Western Cherokees, provides as follows:

"Whereas the Cherokee delegates contend that the amount expended for one year's ubsistence of the Eastern Cherokees after their arrival in the West is not properly hargeable to the treaty fund, it is hereby agreed that the question shall be submit-ed to the Senate of the United States for its decision, which shall decide whether the ubsistence shall be borne by the United States or the Cherokee fund, and if by the herokees, then to say whether the subsistence shall be charged at a greater rate han thirty-three thirty-three one-hundredths dollars per head; and also the ques-ion whether the Cherokee Nation shall be allowed interest on whatever sum may e found to be due the nation, and from what date and at what rate per annum."

The 12th article of this treaty was stricken out by the Senate upon the ratifica-ion of the treaty, which was assented to by the Cherokees.

The questions submitted to the Senate of the United States by the 11th article ere settled by the Senate, and thereby became a part of the treaty stipulations by

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the adoption of the following resolutions, September 5, 1850 (Cong. Globe, vol. 21, part 2, 1849–'50, p. 1760):

"*Resolved by the Senate of the United States*, That the Cherokee Nation of Indians are entitled to the sum of $189,422.76 for subsistence, being the difference between the amount actually paid and that expended by the United States, and which excess was improperly charged to the 'treaty fund' in the report of the accounting officer of the Treasury.

"*Resolved*, That it is the sense of the Senate that interest at the rate of 5 per cent. per annum should be allowed upon the sums found due the Eastern and Western Cherokees, respectively, from the 12th day of June, 1838, upon the treaty of 1846."

By the second of the above resolutions it was declared that the Cherokees were entitled to interest upon any sums due them under the treaties of 1835 and 1846 from the 12th day of June, 1838.

The committee find that among the items of the claim of the Western Cherokees there is one that is a manifest error in settling with these Indians, namely, the item of "removal and subsistence, at the rate of $53.33 per head, $909,313.34," found on page 19, Report of the Commissioner of Indian Affairs, Ex. Doc. 65, 1st session 30th Congress. This item in the Commissioner's statement of the account does not state the number of Indians removed and subsisted at that rate, but on page 17 of that report the number is stated at 13,149. That number at the rate of $53.33 per head would amount to the sum of $701,236 instead of $909,313.34, as charged, making an error against the Western Cherokees of $208,077.34 in the simple matter of calculation.

Besides this item, these Indians claim that by a fair construction of the treaties with them, and the acts of Congress relating to their rights under these treaties, they should not be charged, as was done by the accounting officers of the government in their settlements, with the items—

First. The charge for claims of citizens of the United States of $59,574.25.

Second. The charge for claims of individual Cherokees, $17,561.41.

Third. The charge for compensation to Cherokee committee, $22,026.89.

Fourth. The charge for spoliation, rents, and damages, $434,861.85.

Fifth. The charge for reservations, allowed, $116,882.50.

Sixth. The charge for pre-emptions, $15,589.

Seventh. The charge for and on account of removal and subsistence, $32,666,65.

There is a peculiarity about the last of the above items that throws some doubt around its correctness, for the cost of subsistence and removal to be borne by the Western Cherokees, as above shown, had not only been charged to them, but overcharged, and the fact that it took just this latter sum to effect a balance of the account with these Indians seems to furnish the reason for the doubt about the correctness of this last item.

The claimants contend, and the committee are of opinion, that the receipt by these Indians of the sum of $523,782.18, appropriated by the act of September 30, 1850, *in* the manner in which they received it, does not preclude them from making their claim for any other sum that may be justly due them under a fair and proper interpretation of the treaties with them. Though the act making that appropriation provides "that the Indians who shall receive the said money shall first respectively sign a receipt or release acknowledging the same to be in full of all demands under the fourth article of said treaty," it appears that before these Indians would consent to receive the said sum thus appropriated, they were assured by the agent of the government sent to make the payments, Mr. John Drennon, that they could receive the money under protest and thereby preserve their rights under the treaties between them and the United States for any amounts that might be due them by a just and equitable construction of said treaties.

It also appears that these Indians, before receiving any part of that appropriation, did formally and in writing deliver to said agent their solemn protest against receiving the same as a full settlement of all their claims against the United States under said treaties, which protest, as appears by the records of the Interior Department, was forwarded to the Commissioner of Indian Affairs at Washington City.

The facts necessary to determine the justness of the claim preferred by these Indians consist almost, if not entirely, of the public treaties, proceedings of the Senate, acts of Congress, and the records of the several departments of the government, all of which are preserved.

The committee are of opinion that the claim of these Indians possesses sufficient merit to demand a careful and thorough investigation of the same; that such an investigation involves a judicial interpretation of the several treaties between them and the United States, the construction of the several acts of Congress in relation thereto, and the examination of all settlements made and accounts stated with them under these treaties and acts of Congress; that such an investigation cannot be made by a committee of Congress in the limited time allowed such committee by the performance of the ordinary legislative duty imposed upon its members; and that this case should receive a full investigation by the courts.

The committee therefore report the accompanying bill, and recommend its passage.

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Copy of proceedings of the council of the Old Settler or Western Cherokee Indians, November 30, 1880.

TAHLEQUAH, CHEROKEE NATION, *November* 20, 1880.

At a meeting of the Old Settler Cherokees, held in the council room of the capitol, there were present Rev. W. A. Duncan, Mr. J. M. Bryan, H. D. Reese, W. C. Woodall, D. C. Duncan, Caleb Starr, Wm. McCracken, J. M. Smith, and John Hendricks, George Drum, B. H. Severe, Simon Girty, George Critenton, Charles Johnson, L. C. Woodall, Wm. Hendricks, members of council; J. M. Duncan and other old settlers.

W. A. Duncan was called to preside, and H. D. Reese appointed secretary.

Mr. J. M. Bryan was requested to make his report as to the present status of the claim for which he is agent, &c.

Mr. Bryan made his report to the meeting, and made known that the said claim of the Old Settlers against the United States was now before the Indian Committee of the Senate, and that for various causes has been delayed to be reported to the Senate.

Report was interpreted and adopted. It was moved and seconded that a committee be appointed by the chair to report resolutions reiterating the powers granted Mr. Bryan by a former meeting. Adopted.

The chair appointed Messrs. H. D. Reese, W. C. Woodall, and John Hendricks said committee, who submitted the following, to wit:

To the OLD SETTLER COUNCIL now in session:

Whereas, According to notice published in the Cherokee Advocate by J. M. Bryan, William Wilson, and William Hendricks, our commissioners appointed in 1875 to prosecute the "Old Settler" Cherokee claim against the Government of the United States for balances due said "Old Settler" Cherokees, as provided for mainly by Cherokee treaty of 1846; and

Whereas, Our said commissioners in their reports have given general satisfaction up to the time of the present council: Therefore,

Resolved, That we this day ratify and confirm all the action taken in the premises by our said commissioners, and hereby confirm all contracts made with attorneys by our said commissioners for the services rendered in the prosecution of our said claim.

Be it further resolved, That J. M. Bryan, our special commissioner and attorney, who is himself a citizen of the Cherokee Nation and an "Old Settler," and by our former council was duly made treasurer for the amount of 35 per cent. of the amount of the claim that may be allowed. The first council creating said commission was in 1875, at which council 35 per cent. of the whole claim was set apart to pay the expense of former Old Settlers councils, to pay the expenses of our commissioners, to pay the expenses of attorneys employed to help prosecute said claim, or as much thereof as might be necessary.

Therefore, we again reiterate that J. M. Bryan is fully authorized to receive the said amount of 35 per cent. of the whole amount allowed on said claim, as the "Old Settler" Cherokee treasurer, and to receipt to the proper authorities of the United States for said amount, which shall be the "Old Settler" Cherokees' receipt for the same.

Submitted by—

H. D. REESE,
W. C. WOODALL,
JOHN HENDRICKS,
Committee.

The above resolution being interpreted and put to voto was unanimously adopted.

W. A. DUNCAN,
President.

H. D. REESE,
Secretary.

I hereby certify that the above is a true copy of the proceedings had by the "Old Settlers" council.

Given under my hand and seal of office, at Tahlequah, Cherokee Nation, I. T., this 23d day of November, 1880.

ALLEN ROSS, *Clerk,*
Tahlequah Dist., C. N., I. T.

Approved November 26, 1880.

D. W. BUSHYHEAD,
Principal Chief, Cherokee Nation.

I hereby certify that this is a true copy of the original.

DELOZIER DAVIDSON,
Notary Public.

WASHINGTON, D. C., *January* 3, 1881.

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LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

In compliance with section 194 *Revised Statutes, reports of the names of the clerks and other persons employed in the War Department and offices thereof from December*, 1881, *to November* 30, 1882.

DECEMBER 19, 1882.—Ordered to lie on the table and be printed.

WAR DEPARTMENT,
Washington City, December 18, 1882.

The Secretary of War has the honor to transmit to Congress, in compliance with section 194 of the Revised Statutes, the accompanying reports of the names of the clerks and other persons employed in the War Department, and the offices thereof, from December 1, 1881, to November 30, 1882, and to respectfully state that they have all been usefully employed, and that the services of none of them can be dispensed with without detriment to the public service. The removal of any individuals and the appointment of others in their stead is not required for the better dispatch of business.

ROBERT T. LINCOLN,
Secretary of War.

The PRESIDENT *pro tempore of the United States Senate.*

Statement showing the names, compensation, &c., of clerks, messengers, assistant messengers, watchmen, and laborers, employed in the office of the Secretary of War from December 1, 1881, *to November* 30, 1882.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Chief Clerk.					
1	John Tweedale	$2,000 2,500	Dec. 1, 1881 July 1, 1882	June 30, 1882 Nov. 30, 1882	$1,168 00 1,040 00	Pennsylvania.
					2,208 00	
	Disbursing Clerk.					
2	E. M. Lawton	2,000	Dec. 1, 1881	Nov. 30, 1882	2,000 00	District of Columbia.
	Chiefs of Divisions.					
3	Samuel Hodgkins	2,000	Dec. 1, 1881	Nov. 30, 1882	2,000 00	Massachusetts.
4	Jay Stone	*1,800 2,000	Dec. 1, 1881 July 3, 1882	July 2, 1882 Nov. 30, 1882	1,059 78 821 13	Minnesota.
					1,880 91	

* Stenographer.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Chiefs of Divisions—Cont'd.					
5	L. W. Tolman	$1,800	Dec. 1, 1881	Aug. 4, 1882	$1,221 20	Massachusetts.
		2,000	Aug. 5, 1882	Nov. 30, 1882	641 78	
					1,862 98	
	Stenographer.					
6	Charles S. Sweet	Class 4	Dec. 1, 1881	July 2, 1882	1,059 78	Illinois.
		1,800	July 3, 1882	Nov. 30, 1882	740 22	
					1,800 00	
	Class 4.					
7	R. Duryee	1,800	Dec. 1, 1881	Nov. 30, 1882	1,800 00	Connecticut.
8	C. H. Carrington	1,800	....do	....do	1,800 00	Ohio.
9	C. Bankes Brookes	1,800	....do	....do	1,800 00	New York.
10	B. F. Wilkins	1,600	Dec. 1, 1881	July 2, 1882	942 70	Vermont.
		1,800	July 3, 1882	Nov. 30, 1882	740 22	
					1,682 92	
11	A. N. Thompson	1,400	Dec. 1, 1881	Aug. 4, 1882	951 15	Dist. of Columbia.
		1,800	Aug. 5, 1882	Nov. 30, 1882	578 81	
					1,529 96	
	Class 3.					
12	W. B. Lee	1,600	Dec. 1, 1881	Nov. 30, 1882	1,600 00	Massachusetts.
13	James A. Randall	1,600	.. do	.. do	1,600 00	New York.
14	Sydney E. Smith	1,600	....do	....do	1,600 00	District of Columbia.
15	Charles R. Fosdick	1,400	Dec. 1, 1881	July 2, 1882	825 61	Ohio.
		1,600	July 3, 1882	Nov. 30, 1882	657 30	
					1,482 91	
	Class 2.					
16	A. H. Morrison	1,400	Dec. 1, 1881	Nov. 30, 1882	1,400 00	Missouri.
17	M. P. King	1,400	... do	... do	1,400 00	District of Columbia.
18	Francis W. Edwards	1,400	July 3, 1882	... do	574 39	Massachusetts.
19	Louis Koerth	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	Dist. of Columbia.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 86	
					1,262 99	
	Class 1.					
20	N. H. Stevens	1,200	Dec. 1, 1881	Nov. 30, 1882	1,200 00	New York.
21	H. C. Rutter	1,200	....do	....do	1,200 00	Ohio.
22	Charles E. Illsley	1,200	....do	....do	1,200 00	Oregon.
23	F. M. Guild	1,200	... do	....do	1,200 00	Ohio.
24	W. R. Hillyer	1,200	....do	....do	1,200 00	Florida.
25	C. L. Walker	1,200	....do	....do	1,200 00	New York.
26	F. W. Ford	1,200	Aug. 12, 1882	....do	363 04	District of Columbia.
27	Charles C. M. Loeffler	1,200	....do	....do	363 04	Do.
28	F. P. Bronaugh	1,200	....do	....do	363 04	Do.
29	Frank D. Concannon	1,200	... do	....do	363 04	Illinois.
30	Thomas Lewis	1,200	....do	... do	363 04	District of Columbia.
31	Edward Dunn	1,200	....do	....do	363 04	Ohio.
	Class $1,000.					
32	G. C. Thomas	A. Mes	Dec. 1, 1881	Dec. 12, 1881	22 83	Dist. of Columbia.
		1,000	Dec. 13, 1881	Nov. 30, 1882	967 63	
					990 46	
	Messengers.					
33	W. S. Dupee	840	Dec. 1, 1881	Nov. 30, 1882	840 00	Kentucky.
34	Joseph H. Harris	Lab.	Dec. 1, 1881	Aug. 4, 1882	427 77	Maine.
		A. Mes	Aug. 5, 1882	Oct. 31, 1882	172 18	
		840	Nov. 1, 1882	Nov. 30, 1882	69 24	
					669 19	
	Assistant Messengers.					
35	R. J. Squire	720	Dec. 1, 1881	Nov. 30, 1882	720 00	Connecticut.
36	Henry D. Burwell	720	....do	....do	720 00	Virginia.
37	A. Brooks	720	Dec. 13, 1881	....do	697 17	Do.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Assistant Messengers—Contd.					
38	G. Forsberg	$720	Aug. 14, 1882	Nov. 30, 1882	$213 92	District of Columbia.
39	Patrick Carroll	720	Oct. 1, 1882	..do	120 00	Do.
40	Thomas Irwin, jr	Lab. 720	Dec. 1, 1881 Nov. 1, 1882	Oct. 31, 1882 Nov. 30, 1882	605 60 59 35	Dist. of Columbia.
					664 95	
	Watchmen.					
41	Thomas Gooley	720	Dec. 1, 1881	Nov. 30, 1882	720 00	District of Columbia.
42	W. L. Parvin	720	....do	....do	720 00	Iowa.
43	W. A. Luce	720	....do	....do	720 00	Maine.
44	John P. Russell	720	....do	....do	720 00	Iowa.
45	Charles Gautier	720	....do	....do	720 00	District of Columbia.
46	James McCrea	720	Dec. 3, 1881	....do	716 74	New York.
	Laborers.					
47	E. Stannard	660	Dec. 1, 1881	Nov. 30, 1882	660 00	District of Columbia.
48	John D. Leonard	660	....do	....do	660 00	Do.
49	Henry Harris	660	....do	....do	660 00	Do.
50	George W. Graves	660	Mar. 23, 1882	....do	456 50	Do.
51	G. W. S. Milby	660	Aug. 7, 1882	....do	208 64	Do.
52	William D. Buckley	660	Nov. 21, 1882	....do	18 53	Do.
53	Thomas Withers	660	....do	....do	18 53	Georgia.
	ADDITIONAL.					
	Class 3.					
54	R. E. Moore	*1,400 1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	951 15 513 83	Michigan.
					1,464 98	
55	T. T. Stewart	1,600	Aug. 12, 1882	....do	483 40	Vermont.
	Class 2.					
56	C. B. Tanner	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	Pennsylvania.
					1,262 99	
57	Thomas M. Reed	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	New Jersey.
					1,262 99	
58	David Fitz Gerald	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	Iowa.
					1,262 99	
	Class 1.					
59	C. S. Chesney	1,200	Aug. 19, 1882	Nov. 30, 1882	340 21	Maryland.
60	F. I. Hunter	1,200	....do	....do	340 21	District of Columbia.
61	F. W. Matteson	1,200	Aug. 21, 1882	....do	333 69	Illinois.
62	William H. Murphy	1,200	Aug. 22, 1882	....do	330 43	Do.
63	M. L. Stowell	1,200	Aug. 24, 1882	....do	323 91	Kansas.
	Messengers.					
64	J. H. Stewart	A. mes 840	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	488 48 270 11	Maryland.
					758 59	
65	W. C. Costin	A. mes 840	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	488 48 270 11	Dist. of Columbia.
					758 59	

*Archive Branch.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	ARCHIVE BRANCH.					
	Class 3.					
66	Frank Jones	$1,200 1,600	Dec. 1, 1881 Aug. 1, 1882	July 31, 1882 Nov. 30, 1882	$801 09 513 83	New York.
					1,314 92	
	Class 2.					
67	J. P. Hodges	(*) 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	Iowa.
					1,262 99	
	Class 1.					
68	T. H. Parsons	1,200	Dec. 1, 1881	Nov. 30, 1882	1,200 00	Maryland.
69	Thomas Reed	1,200	....do	...do	1,200 00	District of Columbia.
70	B. L. Thomson	1,200	Aug. 5, 1882	....do	385 87	New York.
	LIEU OF GENERAL SERVICE.					
	Class 1.					
71	Frank M. Kiggins	1,200	Aug. 12, 1882	Nov. 30, 1882	363 04	Tennessee.
72	Daniel A. Whitesell	1,200	Aug. 14, 1882	....do	356 52	Pennsylvania.
73	Macdonald Douglass	1,200	....do	....do	356 52	Do.
74	Joshua T. Smith	1,200	Aug. 19, 1882	....do	340 21	New York.
75	William E. Herbert	1,200	Sept. 12, 1882	....do	261 96	District of Columbia.
76	Maurice Pechin	1,200	Oct. 3, 1882	....do	193 48	Do.
77	Robert W. Kerr	1,200	Nov. 1, 1882	....do	98 91	Ohio.
	Class $1,000.					
78	D. Elmer Sharretts	(†) 1,000	Dec. 1, 1881 Aug. 17, 1882	Aug. 16, 1882 Nov. 30, 1882	511 95 288 28	Pennsylvania.
					800 23	
79	William C. Taylor	Mess. 1,000	Dec. 1, 1881 Oct. 1, 1882	Sept. 30, 1882 Nov. 30, 1882	700 00 166 00	Virginia.
					866 00	
80	Samuel B. Loring	1,000	Oct. 2, 1882	Nov. 30, 1882	163 28	Do.
81	George W. Talburtt	1,000	Oct. 25, 1882	....do	100 78	Kentucky.
82	David B. Clark	1,000	Oct. 28, 1882	....do	92 63	Ohio.
	WAR DEPARTMENT BUILDING.					
	Superintendent.					
1	John Tweedale	250	July 1, 1882	Nov. 30, 1882	104 00	Pennsylvania.
	Engineer.					
2	M. R. Thorp	1,200	Dec. 1, 1881	Nov. 30, 1882	1,200 00	Ohio.
	Assistant Engineer.					
3	H. C. Griffith	1,000	Dec. 1, 1881	Nov. 30, 1882	1,000 00	District of Columbia.
	Machinist.					
4	B. T. McCartney	900	Aug. 15, 1882	Nov. 30, 1882	264 94	Maryland.
	Skilled Laborer.					
5	John T. McKeon	720	Nov. 3, 1882	Nov. 30, 1882	55 43	District of Columbia.
	Elevator Conductor.					
6	Theodore Vockey	720	Nov. 21, 1882	Nov. 30, 1882	20 22	Maryland.
	Fireman.					
7	H. C. James	720	Dec. 1, 1881	Nov. 30, 1882	720 00	District of Columbia.

* Office Secretary of War as Class 1.
† War Department building as elevator conductor.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Watchmen.					
8	Stephen Seuter	$720	Dec. 1, 1881	Nov. 30, 1882	$720 00	Vermont.
9	William H. Brooks	720	....do	....do	720 00	Maryland.
10	Charles H. Wood	720	....do	....do	720 00	Maine.
11	John J. Janezeck	720	Sept. 4, 1882	....do	172 83	Pennsylvania.
	Laborers.					
12	D. Howe	660	Dec. 1, 1881	Nov. 30, 1882	660 00	District of Columbia.
13	Henry Thompson	660	Dec. 13, 1881	....do	639 08	Do.
14	C. A. Payton	600	Aug. 5, 1882	....do	192 93	Virginia.
	Charwomen.					
15	Eliza Warden	180	Dec. 1, 1881	Nov. 30, 1882	180 00	District of Columbia.
16	Alvina Schaefer	180	....do	....do	180 00	Do.
17	Honore Mahoney	180	....do	....do	180 00	Do.
18	Harriet Robeson	180	....do	....do	180 00	Do.
19	Mary Ward	180	....do	....do	180 00	New York.
20	Honore Kelly	180	....do	....do	180 00	Wyoming.
21	Mary Smith	180	....do	....do	180 00	District of Columbia.
22	Mary J. Stewart	180	....do	....do	180 00	Do.
23	Hannah Leo	180	....do	....do	180 00	New Jersey.
24	Annie Lilly	180	Feb. 6, 1882	....do	147 00	District of Columbia.
25	Helen Scott	180	Aug. 15, 1882	....do	53 00	Do.
26	Bridget Giddings	180	....do	....do	53 00	Do.
	ADDITIONAL.					
	Assistant Engineer.					
27	Francis Sasse	1,000	Nov. 14, 1882	Nov. 30, 1882	46 44	Missouri.
	Captain of the Watch.					
28	George E. Tyson	1,200	Oct. 1, 1882	Nov. 30, 1882	200 00	Connecticut.
	Carpenter.					
29	A. R. Johnson	720	Aug. 5, 1882	Sept. 30, 1882	111 52	Virginia.
		1,000	Oct. 1, 1882	Nov. 30, 1882	166 00	
					277 52	
	Elevator Conductor.					
30	James Lamb	(*)	Dec. 1, 1881	Aug. 16, 1882	511 95	Dist. of Columbia.
		(†)	Aug. 17, 1882	Nov. 20, 1882	187 83	
		720	Nov. 21, 1882	Nov. 30, 1882	20 92	
					720 00	
	Laborer.					
31	John Smith	660	Aug. 15, 1882	Nov. 30, 1882	194 29	North Carolina.
	Firemen.					
32	James W. Loveless	720	Nov. 21, 1882	Nov. 30, 1882	20 22	District of Columbia.
33	Walter T. Ward	720	....do	....do	20 22	Nebraska.
34	Robert B. Randolph	720	Nov. 23, 1882	....do	16 30	Virginia.
35	James Waddell	720	Nov. 25, 1882	....do	12 39	Maryland.
36	Urban Gebhart	720	Nov. 29, 1882	....do	4 56	District of Columbia.
	Charwomen.					
37	Virginia Scranage	180	Oct. 14, 1882	Nov. 30, 1882	23 63	District of Columbia.
38	Catharine Nichols	180	Oct. 16, 1882	....do	22 66	Do.
39	Malvina Lee	180	....do	....do	22 66	Do.
40	Priscilla Burgess	180	....do	....do	22 66	Do.
41	Abbie Paul	180	Oct. 17, 1882	....do	22 17	Do.
42	Judith Daly	180	....do	....do	22 17	Do.
43	Laura Moody	180	Nov. 24, 1882	....do	3 59	Do.

*Watchman. †Elevator conductor and regulator.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Charwomen—Continued.					
44	May E. Brooks	$180	Nov. 24, 1882	Nov. 30, 1882	$3 59	District of Columbia.
45	Mary Murphy	180	....do	... do	3 59	Do.
46	Emma Dutch	180	Nov. 27, 1882	... do	2 12	Do.
47	Martha Yates	180	....do	....do	2 12	Do.
	Hostlers.					
48	Penrose Thomas	600	Nov. 24, 1882	Nov. 30, 1882	11 96	Pennsylvania.
49	John H. Wilson	540	Aug. 5, 1882	....do	173 64	Maryland.
50	John W. Thompson	540	....do	....do	173 64	New York.
	Watchman.					
51	William Crompton	540	Aug. 5, 1882	Nov. 30, 1882	173 64	District of Columbia.
	OLD NAVY BUILDING					
	Watchmen.					
1	M. C. Leonard	720	Dec. 1, 1881	Nov. 30, 1882	720 00	Army.
2	James Kelly	720	....do	....do	720 00	District of Columbia.
3	August P. Baurman	720	....do	....do	720 00	Army.
4	John T. Neale	720	Nov. 21, 1882	....do	20 22	New York.
	Firemen.					
5	Fred. Scheede	720	Dec. 1, 1881	Nov. 30, 1882	720 00	New Jersey.
6	John Higginson	720	Nov. 27, 1882	... do	8 48	New York.
	Laborer.					
7	Francis H. Baxter	660	Oct. 10, 1882	Nov. 30, 1882	93 85	District of Columbia.

ORDNANCE OFFICE,
War Department, Washington, December 1, 1882.

SIR: In compliance with section 194 Revised Statutes, United States, I have the honor to submit herewith list of clerks and others employed in the Ordnance Office from December 1, 1881, to November 30, 1882, in accordance with circular of the 24th ultimo.

I have also to state that all the persons so engaged have been usefully employed, and that the services of none of them can be dispensed with without detriment to the public service.

Very respectfully, your obedient servant,

S. V. BENÉT,
Brigadier-General, Chief of Ordnance.

The Hon. SECRETARY OF WAR.

Statement showing the names, compensation, &c., of clerks, messengers, &c., employed in the office of the Chief of Ordnance from December 1, 1881, *to November* 30, 1882.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Chief Clerk.					
1	V. McNally*	$2,000	Dec. 1, 1881	May 25, 1882	$1,802 20	Massachusetts.
2	John J. Cook	1,200	....do	....do	581 32	Dist. of Columbia.
		2,000	May 26, 1882	Nov. 30, 1882	1,029 81	
					1,611 13	

* Resigned May 25, 1882.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Class 4.					
3	John Moran	$1,800	Dec. 1, 1881	Nov. 30, 1882	$1,800 00	Army.
4	E. A. Skillman	1,600	....do	Aug. 4, 1882	1,086 17	New Jersey.
		1,800	Aug. 5, 1882	Nov. 30, 1882	578 81	
					1,664 98	
5	A. W. Pentland	1,600	Dec. 1, 1881	Aug. 4, 1882	1,086 17	Pennsylvania.
		1,800	Aug. 5, 1882	Nov. 30, 1882	578 81	
					1,664 98	
	Class 3.					
6	S. C. Hull	1,400	Dec. 1, 1881	Aug. 4, 1882	951 15	Illinois.
		1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,464 98	
7	L. J. Bryant	1,400	Dec. 1, 1881	Aug. 4, 1882	951 15	Wisconsin.
		1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,464 98	
	Class 2.					
8	R. L. Walter	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	Army.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 86	
					1,262 99	
9	H. F. J. Brown	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	Pennsylvania.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 86	
					1,262 99	
	Class 1.					
10	Charles S. Keller	1,200	Dec. 1, 1881	Nov. 30, 1882	1,200 00	South Carolina.
11	Charles E. Bailey	1,200	....do	...do	1,200 00	Dist. of Columbia.
12	Austin Edgerly	1,200	....do	...do	1,200 00	Maine.
13	R. G. Sutton	1,000	do	May 25, 1882	485 10	Pennsylvania.
		1,200	May 26, 1882	Nov. 30, 1882	618 68	
					1,103 78	
14	R. A. Foster	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Dist. of Columbia.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
15	S. M. Barker	720	June 23, 1882	Aug. 4, 1882	84 30	Pennsylvania.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					470 16	
16	Seth L. Clark	1,068	Dec. 1, 1881	Aug. 7, 1882	772 81	Vermont.
		1,200	Aug. 8, 1882	Nov. 30, 1882	376 08	
					1,148 89	
17	S. E. Culverwell	1,068	Dec. 1, 1881	Aug. 7, 1882	764 62	Maryland.
		1,200	Aug. 8, 1882	Nov. 30, 1882	376 08	
					1,140 70	
18	Jas. M. Wineberger	1,068	Dec. 1, 1881	Aug. 7, 1882	764 62	Virginia.
		1,200	Aug. 8, 1882	Nov. 30, 1882	376 08	
					1,140 70	
19	Thomas Q. Leckron	1,068	Dec. 1, 1881	Aug. 7, 1882	764 62	Maryland.
		1,200	Aug. 8, 1882	Nov. 30, 1882	376 08	
					1,140 70	
20	James S. Pierce	1,068	Dec. 1, 1881	Aug. 7, 1882	764 62	Pennsylvania.
		1,200	Aug. 8, 1882	Nov. 30, 1882	376 08	
					1,140 70	

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Class 1—Continued.					
21	Nathan Hazen	$1,068 1,200	Dec. 1, 1881 Aug. 8, 1882	Aug. 7, 1882 Nov. 30, 1882	$731 68 376 08 1,107 76	Pennsylvania.
22	John C. Winn	1,068 1,200	Dec. 1, 1881 Aug. 8, 1882	Aug. 7, 1882 Nov. 30, 1882	731 68 376 08 1,107 76	Ohio.
23	John D. Wilkins	1,068 1,200	Dec. 1, 1881 Aug. 8, 1882	Aug. 7, 1882 Nov. 30, 1882	731 68 376 08 1,107 76	Dist. of Columbia.
24	George H. Ingraham	1,068 1,200	Dec. 1, 1881 Aug. 8, 1882	Aug. 7, 1882 Nov. 30, 1882	731 68 376 08 1,107 76	South Carolina.
25	William H. Smiley	1,068 1,200	Dec. 1, 1881 Aug. 8, 1882	Aug. 7, 1882 Nov. 30, 1882	731 68 376 08 1,107 76	Maine.
26	John E. McLeran	1,068 1,200	Dec. 1, 1881 Aug. 8, 1882	Aug. 7, 1882 Nov. 30, 1882	731 68 376 08 1,107 76	Dist. of Columbia.
27	George A. Thacher	1,068 1,200	Dec. 1, 1881 Aug. 8, 1882	Aug. 7, 1882 Nov. 30, 1882	731 68 376 08 1,107 76	Minnesota.
28	Robert M. Taylor	1,068 1,200	Dec. 1, 1881 Aug. 8, 1882	Aug. 7, 1882 Nov. 30, 1882	731 68 376 08 1,107 76	Maryland.
29	John S. M. Neill	1,068 1,200	Dec. 1, 1881 Aug. 8, 1882	Aug. 7, 1882 Nov. 30, 1882	731 68 376 08 1,107 76	Delaware.
30	Russell West	1,068 1,200	Dec. 1, 1881 Aug. 8, 1882	Aug. 7, 1882 Nov. 30, 1882	731 68 376 08 1,107 76	Louisiana.
31	Martin Darnall	1,068 1,200	Dec. 1, 1881 Aug. 8, 1882	Aug. 7, 1882 Nov. 30, 1882	764 42 376 08 1,140 70	Maryland.
	$1,000 *per annum.*					
32	William A. Morsell	720 1,000	Dec. 1, 1881 May 26, 1882	May 25, 1882 Nov. 30, 1882	348 79 514 90 863 69	Dist. of Columbia.
33	John M. Smith	864 1,000	Dec. 1, 1881 Aug. 8, 1882	Aug. 7, 1882 Nov. 30, 1882	589 38 312 74 902 12	Army.
	Messengers.					
34	Frank M. Warren	864 840	Dec. 1, 1881 Aug. 8, 1882	Aug. 7, 1882 Nov. 30, 1882	632 88 263 26 896 14	New York.
35	Stephen Ganz	864 840	Dec. 1, 1881 Aug. 8, 1882	Aug. 7, 1882 Nov. 30, 1882	624 63 263 26 887 89	Pennsylvania.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Assistant Messenger.					
36	John A. Simms	$864	Dec. 1, 1881	Aug. 7, 1882	$580 38	Maryland.
		720	Aug. 8, 1882	Nov. 30, 1882	225 66	
					815 04	
	Laborer.					
37	John E. Brooke	660	Dec. 1, 1881	Nov. 30, 1882	660 00	District of Columbia.

WAR DEPARTMENT, BUREAU OF MILITARY JUSTICE,
Washington, D. C., December 1, 1882.

SIR: I have the honor to submit herewith a list of the names of the clerks and messengers employed in this bureau during the year ending November 30, 1882, together with the time each person was actually employed, and the sum paid each. They have been usefully employed, but, owing to the want of accommodations for ladies in the building in which this office is located, the ladies employed as clerk and copyist cannot conveniently perform their work at the office, the accommodation in the building being only for men. The services of none of the employés of the bureau can be dispensed with without detriment to the service.

Very respectfully, your obedient servant,

D. G. SWAIM,
Judge-Advocate-General.

Hon. ROBERT T. LINCOLN,
Secretary of War.

Statement showing the names, compensation, &c., of clerks and messengers employed in the Bureau of Military Justice, from December 1, 1881, *to November* 30, 1882.

Number.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Chief Clerk.		1881.	1882.		
1	Joseph McDonald	$1,800	Dec. 1	May 31	$750, as clerk at $125 per month.	Kansas.
			1882.			
			June 1	Nov. 30	$900	
	Clerks Class 3.					
2	Francis G. Saxton	1,600	Dec. 1	Nov. 30	$1,600	Illinois.
3	Thomas Duke	1,600	Dec. 1	May 31	$900, as chief clerk at $1,800	New York.
			1882.			
			June 1	Aug. 4	$266.64, as clerk at $125 per month.	
			Aug. 5	Nov. 30	$515.83, as clerk at $1,600	
	Clerks Class 1.					
4	Thomas Sprague	1,200	1881. Dec. 1	Nov. 30	$1,200	Indiana.
5	John P. Simonton	1,200	Dec. 1	Aug. 18	$768.50, as general service clerk.	Indiana.
			1882.			
			Aug. 19	Nov. 30	$340.21, as clerk at $1,200	
6	Cyrus Chambers	1,200	1881. Dec. 1	Aug. 18	$768.50, as general service clerk.	Iowa.
			1882.			
			Aug. 19	Nov. 30	$340.21, as clerk at $1,200	

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Statement showing the names, compensation, &c.—Continued.

Number.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Clerks class 1—Cont'd.					
7	Seth A. Terry	$1,200	1881. Dec. 1	1882. Aug. 18	$767.15, as general service clerk.	New York.
			1882. Aug. 19	Nov. 30	$340.21, as clerk at $1.200	
	Clerk at $1,000.					
8	May Morrison	1,000	1881. Dec. 1	Aug. 20	$549.07, as copyist at 12 cents per 100 words.	Dist. of Col.
			1882. Aug. 21	Nov. 30	$279.41, as clerk at $1,000	
	Copyist.					
9	Julia L. Lomax	900	1881. Dec. 1	Aug. 21	$629.72, as copyist at 12 cents per 100 words.	Dist. of Col.
			1882. Aug. 22	Nov. 30	247.83, as copyist at $900	
	Messenger.					
	Isaac Lumbard	840	Feb. 9	Aug. 18	$468.70, as general service messenger.	Dist. of Col.
			Aug. 19	Nov. 30	$238.15, as messenger	
	Assistant Messenger.					
	John Tennyson	720	Dec. 1	Nov. 30	$720	Dist. of Col.

WAR DEPARTMENT,
OFFICE OF THE CHIEF SIGNAL OFFICER,
Washington City, December 9, 1882.

SIR: Referring to circular from the department of date November 24, 1882, I have the honor to transmit herewith a statement showing the names, compensation, &c., of clerks, messengers, and laborers employed in this office from December 1, 1881, to November 30, 1882; also a statement showing the names, compensation, &c., of scientific experts, clerks, messengers, laborers, &c., employed in this office, and paid from the appropriation of $40,000 provided for this purpose in appropriation bill approved August 5, 1882.

I am, very respectfully, your obedient servant,

W. B. HAZEN,
Brig. and Bvt. Maj. Gen'l, Chief Signal Officer, U. S. Army.

The Hon. the SECRETARY OF WAR.

Statement showing the names, compensation, &c., of clerks, messengers, and laborers employed in the office of the Chief Signal Officer of the Army from December 1, 1881, *to November* 30, 1882.

Number.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Class 4.					
1	Alexander Ashley	$1,800	Dec. 1, 1881	Nov. 30, 1882	$1,800 00	Pennsylvania.
2	James B. Wimer	1,800	do	do	1,800 00	District of Columbia.

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Statement showing the names, compensation, &c.—Continued.

Number.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Class 1.					
3	John Babcock	$1,200	Dec. 1, 1881	Nov. 30, 1882	$1,200 00	New York.
4	William R. Bushby	1,200	Aug. 23, 1882	....do	327 17	District of Columbia.
5	William M. Beebe, jr	1,200	Oct. 1, 1882	....do	200 00	Ohio.
	Class $1,000.					
6	Howard Hitchins	1,000	Aug. 5, 1882	Nov. 30, 1882	320 89	Maryland.
	Messengers.					
7	Martin A. Penn	840	Aug. 19, 1882	Nov. 30, 1882	238 17	District of Columbia.
8	Edward A. Branham	480	Aug. 5, 1882	... do	154 35	Virginia.
	Assistant Messenger.					
9	Samuel Middleton	720	Dec. 1, 1881	Nov. 30, 1882	720 00	District of Columbia.
	Laborer.					
10	Gabriel Rowe	420	Aug. 5, 1882	Nov. 30, 1882	135 05	Virginia.

Statement showing the names, compensation, &c., of scientific experts, clerks, messengers, laborers, &c., employed in the office of the Chief Signal Officer of the Army, and paid from the appropriation of forty thousand dollars provided for this purpose in the legislative, executive, and judicial appropriation bill, approved August 5, 1882, from August 5, 1882, to November 30, 1882.

Number.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Civilian Assistant.					
1	Cleveland Abbe	$4,500	Aug. 5, 1882	Nov. 30, 1882	$1,442 00	New York.
	Scientific Experts.					
2	Prof. William Ferrel	2,000	Aug. 10, 1882	Nov. 30, 1882	614 61	West Virginia.
	Computers:					
3	Henry A. Hazen	1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	Connecticut.
4	Winslow Upton	1,600	....do	....do	513 83	District of Columbia.
5	Frank Waldo	1,600	... do	....do	513 83	Massachusetts.
6	Thomas Russell	1,500	....do	....do	482 33	Michigan.
	Clerks.					
7	Henry L. Nelson	1,500	Aug. 5, 1882	Nov. 30, 1882	482 33	District of Columbia.
8	Edward W. Nelson	1,500	....do	....do	482 33	Illinois.
9	Thomas J. Spencer *a*	1,200	....do	....do	371 19	Michigan.
10	H. P. Wolcott	1,200	Oct. 26, 1882	....do	118 48	Kansas.
11	Lucian Garner *b*	1,200	Aug. 5, 1882	Aug. 22, 1882	58 70	District of Columbia.
12	Reuben W. Hazen	1,000	....do	Nov. 30, 1882	320 89	Nebraska.
13	J. E. Leaming	1,000	....do	...do	320 89	New Jersey.
14	James J. Lackey *c*	900	....do	Aug. 8, 1882	7 34	District of Columbia.
15	Zeph Fenno	900	....do	Nov. 30, 1882	289 39	Iowa.
16	E. Bierer *d*	900	... do	Aug. 10, 1882	14 67	Kansas.
17	Charles A. Ray *e*	840	....do	Nov. 3, 1882	207 72	Texas.
18	Myron Hunt *f*	720	....do	Nov. 14, 1882	199 57	Illinois.
19	Lilla M. Pavy *g*	720	....do	Nov. 30, 1882	230 88	Missouri.
20	Belle Gaston	720	....do	....do	231 53	District of Columbia.
21	Ada B. Klum	720	....do	....do	231 53	Indiana.
22	Laura Finley	720	....do	....do	231 53	Maryland.
23	Kate L. Roy	720	....do	... do	231 53	District of Columbia.
24	F. H. Rice *d*	720	....do	Aug. 10, 1882	11 74	Ohio.

a Salary raised September 1, 1882, from $1,000 to $1,200 per annum.
b Discharged August 22, 1882.
c Discharged August 8, 1882.
d Discharged August 10, 1882.
e Discharged November 3, 1882.
f Discharged November 14, 1882.
g Discharged November 30, 1882.

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Statement showing the names, compensation, &c.—Continued.

Number.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Clerks—Continued.					
25	Morris Keim *a*	$720	Aug. 5, 1882	Nov. 30, 1882	$227 12	Virginia.
26	Judson D. Russell *b*	600	Oct. 18, 1882	Oct. 31, 1882	22 83	Not known.
27	Madison M. Brewer *c*	600	Aug. 5, 1882	Sept. 21, 1882	78 26	Kansas.
28	Edward A. Hanner	600	Sept. 26, 1882	Nov. 30, 1882	108 15	Ohio.
29	C. H. Clark *d*	420	Aug. 5, 1882	Aug. 14, 1882	11 41	Pennsylvania.
30	Leo Saratoff *e*	360	Oct. 9, 1882	Oct. 27, 1882	18 59	District of Columbia.
	Messengers.					
31	J. W. Gaines	600	Aug. 5, 1882	Nov. 30, 1882	192 92	Virginia.
32	Austin Joyce	540	do	do	173 64	Ohio.
33	John Turley	480	do	do	154 35	District of Columbia.
34	William Patrick	480	do	do	154 35	North Carolina.
35	Hanson Jenifer	420	do	do	135 05	District of Columbia.
36	George Greenwell	420	do	do	135 05	Maryland.
37	Joseph H. Chase	420	do	do	135 05	District of Columbia.
38	R. W. Hayes	420	do	do	135 05	Do.
39	M. Hayes	420	do	do	135 05	Pennsylvania.
40	G. Marston	420	do	do	135 05	Connecticut.
41	Jesse Anderson	420	do	do	135 06	Tennessee.
42	Frank Matthews	420	do	do	135 05	Maryland.
43	Michael Harris	360	do	do	115 77	District of Columbia.
44	George E. Welch	300	do	do	96 47	Do.
45	George J. Heck *f*	300	do	do	92 07	Do.
46	Joseph F. Glasgow *g*	240	do	Nov. 25, 1882	73 69	Do.
47	William Towers *h*	240	Sept. 26, 1882	Oct. 17, 1882	14 35	Do.
48	Guy Penn	240	Aug. 5, 1882	Nov. 30, 1882	77 17	Do.
49	William Dyer	240	do	do	77 17	Do.
50	Theo. P. McClellan	240	Nov. 27, 1882	do	2 83	Do.
51	Thomas P. Frain	180	Aug. 5, 1882	do	57 88	Do.
52	Harry M. Clapp *i*	120	do	Aug. 12, 1882	2 61	Do.
	Engineer.					
53	Alexander McGuiggen	480	Aug. 21, 1882	Nov. 30, 1882	133 48	District of Columbia.
	Stableman.					
54	Richard Sweeny	480	Aug. 5, 1882	Nov. 30, 1882	154 35	District of Columbia.
	Press-boys.					
55	George M. Gartrell	420	Aug. 5, 1882	Nov. 30, 1882	135 05	District of Columbia.
56	W. J. Feeney	420	do	do	135 05	Do.
57	W. E. Howard	360	do	do	115 76	Do.
58	Fayette Corbin *j*	240	do	Nov. 9, 1882	63 26	Do.
59	E. E. Welch	240	do	Nov. 30, 1882	77 17	Do.
60	Thomas A. Sullivan	240	Nov. 13, 1882	do	11 96	Do.
	Telephone-operator.					
61	John T. Howell	240	Aug. 5, 1882	Nov. 30, 1882	77 17	New Jersey.
	Stitchers and folders.					
62	Catherine T. Brannan	300	Aug. 5, 1882	Nov. 30, 1882	96 47	District of Columbia.
63	Elizabeth Brannan	240	Sept. 12, 1882	do	52 39	Do.
64	Mary A. Ross	240	Sept. 19, 1882	do	47 83	Virginia.
	Scrubber.					
65	Mary Watkins *k*	156	Aug. 5, 1882	Nov. 30 1882	47 54	Virginia.
	Inspector.					
66	D. Mullen	$4 00 p. d.	Aug. 5, 1882		4 00	Not known.

a Salary raised September 1, 1882, from $660 to $720 per annum.
b Discharged October 31, 1882.
c Discharged September 21, 1882.
d Discharged August 14, 1882.
e Resigned October 27, 1882.
f Salary raised September 1, 1882, from $240 to $300 per annum
g Discharged November 25, 1882.
h Discharged October 17, 1882.
i Discharged August 12, 1882.
j Discharged November 9, 1882.
k Salary raised October 17, 1882, from $144 to $156 per annum.

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Statement showing the names, compensation, &c.—Continued.

Number.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Painters.					
67	W. A. Hammer *a*	$3 00 p. d.	Aug. 5, 1882	Aug. 31, 1882	$54 75	Not known.
68	E. P. Rollins *a*	3 00 p. d.	....do	....do	45 75	Do.
69	M. Ridgway *a*	3 00 p. d.	....do	....do	63 75	Do.
70	M. T. Randolph *a*	3 00 p. d.	....do	....do	34 80	Do.
	Laborers.					
71	Andrew Burch *b*	360	Aug. 5, 1882	Oct. 31, 1882	70 30	Virginia.
72	W. Washington	420	....do	Nov. 30, 1882	135 05	Maryland.
73	G. H. Auchenbach *c*	1 50 p. d.	Aug. 15, 1882	Aug. 19, 1882	7 50	District of Columbia.
74	Thomas Curtind	1 50 p. d.	Aug. 5, 1882	Oct. 31, 1882	93 00	Do.
75	Felix Chism	1 25 p. d.	....do	Nov. 30, 1882	126 25	Virginia.
76	James Marcey	1 25 p. d.	....do	....do	115 00	Do.
77	Cary Dye	1 25 p. d.	....do	....do	123 12	Do.
78	Richard Burch	1 25 p. d.	....do	....do	121 87	Do.
79	Jacob Burch *e*	1 25 p. d.	....do	Oct. 31, 1882	89 37	Do.
80	James F. Marcey	1 25 p. d.	....do	Nov. 30, 1882	124 37	Do.
81	John Jackson	1 25 p. d.	....do	....do	120 62	Do.
82	Austin Lewis	1 25 p. d.	....do	....do	112 50	Wisconsin.
83	Walter S. Weeden	1 25 p. d.	....do	....do	123 12	District of Columbia.
84	George M. Pettit	1 25 p. d.	....do	....do	121 87	Virginia.
85	William H. Butler	1 25 p. d.	Nov. 1, 1882	....do	32 50	Do.
86	Zip Terry *a*	1 25 p. d.	Aug. 5, 1882	....do	58 50	Do.

a The days employed, between the dates given, were not consecutive.
b Salary raised from $1.25 per diem to $360 per annum, September 1, 1882; resigned October 31, 1882.
c Discharged August 19, 1882.
d Resigned October 31, 1882.
e Resigned October 31, 1882.

WAR DEPARTMENT,
PAYMASTER-GENERAL'S OFFICE,
Washington, D. C., December 4, 1882.

SIR: I have the honor to transmit herewith a statement showing the names, compensation, &c., of clerks, messengers, watchmen, and laborers employed in this office, and also in this building, from December 1, 1881, to November 30, 1882, as required by section 194 of the Revised Statutes. These persons have been usefully employed, and the services of none of them can be dispensed with without detriment to the public service. The removal of any individuals, and the appointment of others in their stead, is not required for the better dispatch of business.

I am, sir, very respectfully, your obedient servant,

WM. B. ROCHESTER,
Paymaster-General, U. S. A.

The Hon. SECRETARY OF WAR.

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Statement showing the names, compensation, &c., of clerks, messengers, laborers, and watchmen employed in the office of the Paymaster-General from December 1, 1881, to November 30, 1882.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Chief Clerk.					
1	G. D. Hanson	$2,000	Dec. 1, 1881	Nov. 30, 1882	$2,000 00	District of Columbia
	Class 4.					
2	William T. Kent	1,800	Dec. 1, 1881	Nov. 30, 1882	1,800 00	Pennsylvania.
3	W. G. Newton	1,800	... do	.. do	1,800 00	Ohio.
4	E. A. Pratt	1,800	....do	....do	1,800 00	New York.
5	T. M. Exley	1,800	... do	... do	1,800 00	Massachusetts.
6	M. M. Bartlett	1,800	... do	.. do	1,800 00	New Hampshire.
7	B. P. Murray	1,800	....do	.. do	1,800 00	New York.
	Class 3.					
8	A. P. Eastman	1,600	Dec. 1, 1881	Nov. 30, 1882	1,600 00	Massachusetts.
9	A. P. Dunlap	1,600	... do	....do	1,600 00	New York.
10	E. Goodrich	1,600	....do	.. do	1,600 00	Ohio.
11	J. A. Sterling	1,600	... do	....do	1,600 00	Do.
12	Z. S. Buckler	1,600	....do	... do	1,600 00	Maryland.
13	F. H. Mundy	1,600	... do	....do	1,600 00	New York.
14	Wm. H. Harrison *a*	1,600	Aug. 9, 1882	....do	496 44	Maryland.
	Class 2.					
15	James P. Pearson	1,400	Dec. 1, 1881	Nov. 30, 1882	1,400 00	New Hampshire.
16	A. M. Salmon	1,400	....do	....do	1,400 00	New Jersey.
17	C. F. Cobb	1,400	.. do	.. do	1,400 00	Maryland.
18	F. I. Willis	1,400	....do	.. do	1,400 00	New York.
19	Geo. Hickenlooper	1,400	.. do	... do	1,400 00	Iowa.
20	James B. Royce	1,400	... do	....do	1,400 00	Vermont.
21	J. L. H. Winfield	1,400	....do	.. do	1,400 00	New York.
22	J. B. Diver	1,400	....do	....do	1,400 00	Do.
23	S. E. Thomason	1,400	.. do	....do	1,400 00	Do.
24	Thos. J. MacNamee	1,400	....do	....do	1,400 00	Massachusetts.
25	E. L. Stone	1,400	....do	....do	1,400 00	District of Columbia
26	Allen Wright	1,400	... do	... do	1,400 00	Vermont.
	Class 1.					
27	James Cross	1,200	Dec. 1, 1881	Nov. 30, 1882	1,200 00	Pennsylvania.
28	William Webb	1,200	... do	....do	1,200 00	Connecticut.
29	John W. Moore	1,200	....do	....do	1,200 00	Pennsylvania.
30	Fred. Thomson	1,200	... do	....do	1,200 00	Army.
31	S. J. Dewey	1,200	....do	....do	1,200 00	New York.
32	Edwin Frey	1,200	....do	....do	1,200 00	West Virginia.
33	Wm. I. Wolfley	1,200	... do	....do	1,200 00	Ohio.
34	Arthur D. Kerr	1,200	....do	do	1,200 00	Maryland.
35	Sam Houston *b*	1,200	....do	Dec. 19, 1881	60 87	Pennsylvania.
36	R. Kingsman *c*	1,000 1,200	....do Dec. 20, 1881	....do Nov. 30, 1882	1,190 52	Indiana.
	Class $1,000.					
37	Robert Hervey ....m	1,000	Dec. 1, 1881	Nov. 30, 1882	1,000 00	Ohio.
38	J. M. Knowles	1,000	....do	... do	1,000 00	District of Columbia
39	Daniel Shannon *d*	720 1,000	....do Dec. 20, 1881	Dec. 19, 1881 Nov. 30, 1882	985 13	Do.
40	James A. Roche *e*	1,000	Aug. 8, 1882	....do	312 74	Do.
	Class $720.					
41	William F. Horton *f*	720	Apr. 19, 1882	June 20, 1882	124 62	District of Columbia
	Assistant Messenger.					
42	E. W. Moore	720	Dec. 1, 1881	Nov. 30, 1882	720 00	Pennsylvania.

a Appointed August 9, 1882.
b Resigned December 19, 1881.
c Promoted from class $1,000, December 20, 1881.
d Promoted from watchman, December 20, 1881.
e Appointed August 8, 1882, paid from appropriation civil employés in lieu of general service enlisted men, 1883.
f Appointed (temporary) April 19, 1882; appointment expired June 20, 1882.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service.		Amount received.	Residence when appointed.
			From—	To—		
	Watchmen.					
43	Michael B. Buckley	$720	Dec. 1, 1881	Nov. 30, 1882	$720 00	District of Columbia.
44	James Loveless *a*	720	Jan. 1, 1882	do	660 00	Do.
	Laborers.					
45	Wallace Grant	660	Dec. 1, 1881	Nov. 30, 1882	660 00	District of Columbia.
46	Chr. Kaufman	660	do	do	660 00	Do.
47	F. R. May	660	do	do	660 00	Do.
	EMPLOYED IN THE BUILDING ON F STREET, OCCUPIED BY THE PAYMASTER-GENERAL.					
	Superintendent of building.					
1	William T. Kent	250	Dec. 1, 1881	Nov. 30, 1882	250 00	Pennsylvania.
	Watchmen.					
2	F. Armstrong	720	Dec. 1, 1881	Nov. 30, 1882	720 00	District of Columbia.
3	Charles Brannan	720	do	do	720 00	Do.
4	W. H. Harrison	720	do	do	720 00	Do.
5	John Davis	720	do	do	720 00	Do.
6	Timothy T. Lane	720	do	do	720 00	Do.
	Laborers.					
7	James Loveless *b*	660	Dec. 1, 1881	Dec. 31, 1881	55 00	District of Columbia.
8	Francis K. Petty	660	do	Nov. 30, 1882	660 00	Do.
9	John M. Ashfield *c*	660	Jan. 1, 1882	Sept. 9, 1882	457 34	Do.
10	William Kearney *d*	660	Sept. 14, 1882	Nov. 30, 1882	140 49	Do.

a Appointed from laborer, building roll, January 1, 1882.
b Discharged December 31, 1881.
c Appointed January 1, 1882; transferred to Surgeon-General's Office September 9, 1882.
d Appointed September 14, 1882.

WAR DEPARTMENT,
OFFICE COMMISSARY-GENERAL OF SUBSISTENCE,
Washington, D. C., December 1, 1882.

SIR: I have the honor to transmit herewith for use under section 194, Revised Statutes, a statement showing the names, compensation, &c., of clerks, messengers, watchmen, and laborers employed in this office, from December 1, 1881, to November 30, 1882.

Respectfully, your obedient servant,

R. MACFEELY,
Commissary-General of Subsistence.

The Hon. SECRETARY OF WAR.

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Statement showing the names, compensation, &c., of clerks, messengers, watchmen, and laborers employed in the Office of the Commissary-General of Subsistence, from December 1, 1881, to November 30, 1882.

No.	Names.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Chief Clerk.					
1	William A. De Caindry..	$2,000	Dec. 1, 1881	Nov. 30, 1882	$2,000 00	Maryland.
	Class 4.					
2	William H. Wetzel.....	1,800	Dec. 1, 1881	Nov. 30, 1882	1,800 00	Pennsylvania.
	Class 3.					
3	John Penn Jones.....	1,600	Dec. 1, 1881	Nov. 30, 1882	1,600 00	Pennsylvania.
4	Charles T. Eldridge.....	1,600	... do	....do	1,600 00	Maine.
5	William H. Partridge....	1,600	....do	....do	1,600 00	New York.
	Class 2.					
6	William Nourse	1,400	Dec. 1, 1881	Nov. 30, 1882	1,400 00	District of Columbia.
7	G. J. L. Foxwell.....	1,400	....do	....do	1,400 00	Army.
8	Charles N. Moore.....	1,400	....do	....do	1,400 00	Wisconsin.
9	Joseph S. Vansant.....	1,400	... do	....do	1,400 00	Iowa.
	Class 1.					
10	D. Austin McCarthy.....	1,200	Dec. 1, 1881	Nov. 30, 1882	1,200 00	District of Columbia.
11	R. S. Kearney.....	1,200	....do	....do	1,200 00	Do.
12	Frank W. Edwards *a*	1,200	....do	July 2, 1882	706 52	Massachusetts.
13	William F. Johnson.....	1,200	....do	Nov. 30, 1882	1,200 00	Pennsylvania.
14	John Barr	1,200	... do	.. do	1,200 00	Delaware.
15	Milan C. Edson *b*	1,200	....do	July 12, 1882	739 13	Minnesota.
16	Thomas M. Moran	1,200	....do	Nov. 30, 1882	1,200 00	District of Columbia.
17	Frederick C. Crawford *c* .	1,200	....do	Sept. 15, 1882	951 09	Illinois.
18	Charles W. Pairo.....	1,200	....do	Nov. 30, 1882	1,200 00	District of Columbia.
19	Shepard S. Everett	1,200	....do	....do	1,200 00	Massachusetts.
20	S. W. Knevals *d*	1,200	July 13, 1882	....do	460 87	New York.
21	Columbus J. Queen *e*.....	1,200	Aug. 1, 1882	....do	398 91	Illinois.
22	James B. K. Elliott *f*.....	1,200	Aug. 9, 1882	....do	372 82	New York.
23	David W. Houghton *f*...	1,200	....do	....do	372 82	Ohio.
24	Joseph Blackwood *f*.....	1,200	....do	....do	372 82	Pennsylvania.
25	Peter Meagher *f*.....	1,200	... do	....do	372 82	Wisconsin.
26	Daniel Stewart *g*.....	1,200	Sept. 16, 1882	....do	248 91	Missouri.
		1,000	Dec. 1, 1881	Sept. 15, 1882	793 24	
					1,042 15	
	Class $1,000.					
27	Alpheus W. Clear	1,000	Dec. 1, 1881	Nov. 30, 1882	1,000 00	Pennsylvania.
28	Lyman B. Cutler *f*.....	1,000	Aug. 9, 1882	....do	310 02	Illinois.
29	George B. Hansell *f*.....	1,000	....do	....do	310 02	District of Columbia.
30	William F. Dewey *f*.....	1,000	....do	....do	310 02	Michigan.
31	Eugene McSweeny *f*.....	1,000	....do	....do	310 02	District of Columbia.
32	A. J. Sanderson *f*.....	1,000	....do	....do	310 02	Pennsylvania.
33	Hermann H. Voss *f*.....	1,000	....do	....do	310 02	District of Columbia.
34	Benjamin F. Smith *f*....	1,000	....do	....do	310 02	Do.
35	William Giusta *h*.....	1,000	Sept. 21, 1882	....do	193 17	Do.
36	F. E. Nussbaum *i*	1,000	Jan. 9, 1882	Feb. 13, 1882	100 00	Pennsylvania.
	Assistant Messenger.					
37	George Lackey	720	Dec. 1, 1881	Nov. 30, 1882	720 00	District of Columbia.
	Watchmen.					
38	Henry Johnson.....	720	Dec. 1, 1881	Nov. 30, 1882	720 00	District of Columbia.
39	Daniel Donovan	720	....do	....do	720 00	Massachusetts.
	Laborers.					
40	William Pinion.....	660	Dec. 1, 1881	Nov. 30, 1882	660 00	Louisiana.
41	James Hannan	660	....do	....do	660 00	District of Columbia.
	Superintendent of Building.					
42	Charles T. Eldridge.....	250	Dec. 1, 1881	Nov. 30, 1882	250 00	Maine.

a Resigned July 2, 1882. *b* Resigned July 12, 1882. *c* Resigned September 15, 1882.
d Appointed July 13, 1882. *e* Appointed August 1, 1882. *f* Appointed August 9, 1882.
g Promoted from class $1,000 to class 1, September 16, 1882. *h* Appointed September 21, 1882.
i Appointed January, 1882, temporary; discharged February 13, 1882.

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WAR DEPARTMENT,
QUARTERMASTER-GENERAL'S OFFICE,
Washington, D. C., December 15, 1882.

SIR: I have the honor to submit herewith report required by section 194, Revised Statutes, showing the names of the clerks and other persons employed in the office of the Quartermaster-General from December 1, 1881, to November 30, 1882, with the time each person was actually employed, and the amount paid each, and residence at time of appointment. They have all been usefully employed, and the removal of none of the present force is recommended.

Very respectfully, your obedient servant,

RUFUS INGALLS,
Quartermaster-General, Bt. Maj. Gen'l, U. S. A.

The Hon. SECRETARY OF WAR.

Report showing the names of clerks and other persons employed in the office of the Quartermaster-General, United States Army, from December 1, 1881, to November 30, 1882.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Chief Clerk.					
1	George K. Finckel	$2,000	Dec. 1, 1881	Nov. 30, 1882	$2,000 00	District of Columbia.
	Class 4.					
2	Ira S. Allen	1,800	Dec. 1, 1881	Nov. 30, 1882	1,800 00	Wisconsin.
3	A. W. Lattimore	1,800	....do	....do	1,800 00	Indiana.
4	Thomas W. Webster	1,800	....do	....do	1,800 00	Maryland.
5	Charles Ebert	1,800	....do	....do	1,800 00	New York.
6	Albert Gaines	1,800	....do	....do	1,800 00	Maine.
7	John B. Tanner	1,800	....do	....do	1,800 00	Delaware.
8	R. V. Belt *a*	1,800	....do	Apr. 24, 1882	718 08	Maryland.
9	Fred A. Gee *b*	1,800	....do	Nov. 30, 1882	1,639 43	New York.
10	John H. Hood	1,800	Aug. 5, 1882	....do	573 91	District of Columbia.
	Class 3.					
11	William H. Hodges	1,600	Dec. 1, 1881	Nov. 30, 1882	1,600 00	New Jersey.
12	George Marsh	1,600	....do	....do	1,600 00	Illinois.
13	John M. Grahame	1,600	....do	....do	1,600 00	Maryland.
14	George E. Davis	1,600	....do	....do	1,600 00	Pennsylvania.
15	B. H. Farless	1,600	....do	....do	1,600 00	New York.
16	Henry W. Smith	1,600	....do	....do	1,600 00	Do.
17	Henry B. Fernald	1,600	....do	....do	1,600 00	Massachusetts.
18	Henry P. Viles	1,600	....do	....do	1,600 00	District of Columbia.
19	Henry D. Saxton	1,600	....do	....do	1,600 00	Do.
20	F. M. Schriener	1,600	Aug. 5, 1882	....do	509 48	Do.
21	F. S. Altemus	1,600	....do	....do	509 48	Pennsylvania.
	Class 2.					
22	Noah H. Martin	1,400	Dec. 1, 1881	Nov. 30, 1882	1,440 00	Pennsylvania.
23	John H. Pickell	1,400	....do	....do	1,400 00	New York.
24	B. J. O'Driscoll	1,400	....do	....do	1,400 00	Do.
25	Robert J. Woodburn	1,400	....do	....do	1,400 00	Pennsylvania.
26	Thomas W. Sanner	1,400	....do	....do	1,400 00	Maryland.
27	Robert Armour	1,400	....do	....do	1,400 00	New York.
28	William H. Burnett	1,400	....do	....do	1,400 00	Iowa.
29	Louis Galeski	1,400	....do	....do	1,400 00	New York.
30	H. H. Parmenter	1,400	....do	....do	1,400 00	Massachusetts.
31	James Williamson	1,400	....do	....do	1,400 00	Pennsylvania.
32	Samuel M. Thatcher	1,400	....do	....do	1,400 00	Do.
33	John B. Pearce	1,400	....do	....do	1,400 00	Ohio.
34	A. W. Ogden	1,400	....do	....do	1,400 00	New York.
35	A. Y. Leech	1,400	....do	....do	1,400 00	District of Columbia.
36	Edward Flagg	1,400	....do	....do	1,400 00	Massachusetts.
37	H. W. Jackson	1,400	....do	....do	1,400 00	Iowa.

a R. V. Belt, resigned April 23, 1882. *b* Fred. A. Gee, promoted fourth class April 27, 1882.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual Salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Class 2—Continued.					
38	Thomas Montgomery	$1,400	Dec. 1, 1881	Nov. 30, 1882	$1,400 00	New York.
39	Isaac N. Thornburg	1,400	do	do	1,400 00	West Virginia.
40	Frank H. Evans	1,400	do	do	1,400 00	New Hampshire.
41	George W. Callahan	1,400	do	do	1,400 00	Pennsylvania.
42	Frank B. Holden	1,400	do	do	1,400 00	Maine.
43	John D. Creighton	1,400	do	do	1,400 00	Massachusetts.
44	L. F. Randolph	1,400	do	do	1,400 00	New York.
45	C. W. Taylor *a*	1,400	Apr. 27, 1882	do	1,317 78	Do.
46	John L. Hawkins	1,400	Aug. 5, 1882	do	445 05	District of Columbia.
47	William H. Fuller	1,400	do	do	445 05	Maryland.
48	Charles W. Jones	1,400	do	do	445 05	Michigan.
49	E. B. Corvazier	1,400	do	do	445 05	District of Columbia.
	Class 1.					
50	L. F. Fix	1,200	Dec. 1, 1881	Nov. 30, 1882	1,200 00	Ohio.
51	Lewis B. Parker	1,200	do	do	1,200 00	South Carolina.
52	Michael Manning	1,200	do	do	1,200 00	New York.
53	J. G. Jaquette	1,200	do	do	1,200 00	Pennsylvania.
54	E. C. Townsend	1,200	do	do	1,200 00	New York.
55	Francis McLean	1,200	do	do	1,200 00	Do.
56	James S. Franklin	1,200	do	do	1,200 00	Pennsylvania.
57	William Ludgate	1,200	do	do	1,200 00	New York.
58	James McMahon	1,200	do	do	1,200 00	Do.
59	D. W. Clever	1,200	do	do	1,200 00	Iowa.
60	William B. Johnson	1,200	do	do	1,200 00	Ohio.
61	George C. Thomas	1,200	do	do	1,200 00	District of Columbia.
62	William Ryan	1,200	do	do	1,200 00	Nebraska.
63	H. Colburn	1,200	do	do	1,200 00	Maryland.
64	Emma D. Sedgwick	1,200	do	do	1,200 00	Connecticut.
65	Louisa A. Byrne	1,200	do	do	1,200 00	District of Columbia.
66	John A. Botts	1,200	do	do	1,200 00	Do.
67	James F. Dooley	1,200	do	do	1,200 00	Do.
68	Lizzie A. Richardson	1,200	do	do	1,200 00	New Hampshire.
69	Emily Ring	1,200	do	do	1,200 00	New York.
70	W. S. McFarlan	1,200	do	do	1,200 00	Missouri.
71	Julia M. Edie	1,200	do	do	1,200 00	District of Columbia.
72	Ettie Van Hook	1,200	do	do	1,200 00	Do.
73	Luke Devlin	1,200	do	do	1,200 00	Do.
74	Marcia Richardson	1,200	do	do	1,200 00	Michigan.
75	E. T. Cowperthwaite	1,200	do	do	1,200 00	Pennsylvania.
76	Ida Allen	1,200	do	do	1,200 00	District of Columbia.
77	James Stone	1,200	do	do	1,200 00	Iowa.
78	Caroline A. Sherman	1,200	do	do	1,200 00	Virginia.
79	E. S. Gurley	1,200	do	do	1,200 00	District of Columbia.
80	Mary L. Davidson	1,200	do	do	1,200 00	Maryland.
81	John Corson	1,200	do	do	1,200 00	Iowa.
82	Wiley Britton	1,200	do	do	1,200 00	Kansas.
83	James G. Nokes	1,200	do	do	1,200 00	District of Columbia.
84	Gertrude Du B. Holgate	1,200	do	do	1,200 00	Pennsylvania.
85	D. D. Tompkins	1,200	do	do	1,200 00	Do.
86	John B. Randolph	1,200	do	do	1,200 00	District of Columbia.
87	James S. Wilson	1,200	do	do	1,200 00	Do.
88	J. J. Pratt	1,200	do	do	1,200 00	New York.
89	Frank O. Ball	1,200	do	do	1,200 00	Wisconsin.
90	Helen J. Paulding	1,200	do	do	1,200 00	New York.
91	H. A. B. Corta	1,200	do	do	1,200 00	Michigan.
92	N. H. Stanton	1,200	do	do	1,200 00	Pennsylvania.
93	Charles W. Hills	1,200	do	do	1,200 00	Ohio.
94	James S. Phelps *b*	1,200	do	Aug. 23, 1882	876 09	Vermont.
95	Augustus Hubbell	1,200	do	Nov. 30, 1882	1,200 00	Do.
96	Eliza D. Stone *c*	1,200	Apr. 5, 1882	do	1,095 88	Massachusetts.
97	Sarah L. Myers *d*	1,200	Apr. 27, 1882	do	1,078 58	Pennsylvania.
98	Margaret S. Worth *e*	1,200	Aug. 23, 1882	do	981 79	New York.
99	Samuel W. Tucker	1,200	Aug. 5, 1882	do	382 60	Pennsylvania.
100	Hiram H. Martin	1,200	do	do	382 60	Illinois.
101	Isaac Strohm	1,200	do	do	382 60	Ohio.
102	John E. White	1,200	do	do	382 60	Do.
103	James M. Pipes	1,200	do	do	382 60	West Virginia.
104	W. T. Pierson	1,200	do	do	382 60	Florida.
105	John A. Miller	1,200	do	do	382 60	New York.
106	J. M. McFarland	1,200	do	do	382 60	District of Columbia.

a C. W. Taylor, promoted second class, April 27, 1882.
b James S. Phelps, transferred to Surgeon-General's Office August 23, 1882.
c Eliza D. Stone, copyist from December 1, 1881, to April 4, 1882.
d Sarah L. Myers, copyist from December 1, 1881, to April 26, 1882.
e Margaret S. Worth, copyist from December 1, 1881, to August 23, 1882.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Class 1—Continued.					
107	William J. Hassall	$1,200	Aug. 5, 1882	Nov. 30, 1882	$382 60	New Jersey.
108	Frank W. Fisher	1,200	....do	....do	382 60	New York.
109	J. M. Chadwick	1,200	....do	....do	382 60	Vermont.
110	L. Fayette Sykes	1,200	Aug. 19, 1882	....do	340 21	New York.
111	William Winans	1,200	....do	....do	340 21	Do.
112	W. D. Hughes	1,200	.. do	....do	340 21	Ohio.
	$1,000 *class.*					
113	Alexander Thompson	1,000	Aug. 14, 1882	Nov. 30, 1882	253 25	Indiana.
114	Lawrence O. Posey	1,000	Aug. 19, 1882	....do	282 85	South Carolina.
115	W. F. McBride	1,000	....do	....do	282 85	Pennsylvania.
116	H. L. Johnson	1,000	....do	....do	282 85	Do.
117	George W. Perrott	1,000	....do	....do	282 85	New Jersey.
118	William Geddes	1,000	....do	....do	282 85	Indiana.
119	F. A. VonTagen	1,000	....do	....do	282 85	Minnesota.
120	George C. Deno	1,000	....do	....do	282 85	District of Columbia.
121	Nathaniel Davidson	1,000	....do	....do	282 85	Virginia.
122	John Berry	1,000	....do	....do	282 85	District of Columbia.
	Draughtsman.					
123	Thomas P. Chiffelle	1,800	Dec 1, 1881	Nov. 30, 1882	1,800 00	District of Columbia.
	Mechanical Engineer.					
124	Louis M. Zuncker	1,600	Aug. 19, 1882	Nov. 30, 1882	452 96	District of Columbia.
	Engineer.					
125	Samuel Dale	1,200	Dec. 1, 1881	Nov. 30, 1882	1,200 00	Maryland.
	Fireman.					
126	James Payne	720	Dec. 1, 1881	Nov. 30, 1882	720 00	District of Columbia.
	Messengers.					
127	George Phelps	840	Dec. 1, 1881	Nov. 30, 1882	840 00	District of Columbia.
128	Henry Payne *a*	840	Aug. 19, 1882	....do	754 02	Do.
	Assistant Messengers.					
129	Thomas Allen	720	Dec. 1, 1881	Nov. 30, 1882	720 00	District of Columbia.
130	Andrew Mills *b*	720	Aug. 26, 1882	....do	675 68	Do.
131	Christopher Shaw	720	Aug. 5, 1882	.. do	229 57	Missouri.
132	Thomas H. Cross	720	....do	... do	229 57	District of Columbia.
133	Dennis D. Reilly	720	....do	...do	229 57	Illinois.
	Laborers.					
134	Charles Wilton	660	Dec. 1, 1881	Nov. 30, 1882	60 00	District of Columbia.
135	Charles McDonough	660	.. do	....do	660 00	Do.
136	George W. White	660	....do	....do	660 00	Ohio.
137	Michael Delehanty	660	Aug. 29, 1882	....do	169 07	District of Columbia.
138	George W. Giddens	660	....do	....do	167 28	Do.
139	Jacob H. Frank	660	Aug. 31, 1882	....do	163 80	Do.
140	Patrick Wall *c*	660	Dec. 1, 1881	Aug. 22, 1882	481 66	Do.
141	Joseph S. F. Sessford *d*	660	....do	Aug. 29, 1882	492 40	Do.
142	Ellen Brady	225	Aug. 19, 1882	Nov. 30, 1882	61 69	Do.
	Female Laborer.					
143	Catherine Graham	240	Aug. 19, 1882	Nov. 30, 1882	66 74	District of Columbia.
	Charwoman.					
144	Isabella Macklin	100	Aug. 19, 1882	Nov. 30, 1882	27 74	District of Columbia.
	Watchmen.					
145	William Lewis	720	Dec. 1, 1881	Nov. 30, 1882	720 00	District of Columbia.
146	M. P. Desmond	720	....do	....do	720 00	Do.
147	James O'Hara	720	....do	....do	720 00	Do.
148	Patrick Delanthy	720	....do	....do	720 00	Do.
149	Fanninge Barnard	720	....do	....do	720 00	Do.
150	Robert E. Fugitt	720	Aug. 5, 1882	....do	229 57	Do.

a Henry Payne, assistant messenger from December 1, 1881, to August 18, 1882.
b Andrew Mills, laborer from December 1, 1881, to August 25, 1882.
c Patrick Wall, transferred to War Department August 23, 1882.
d Joseph S. F. Sessford, transferred to Surgeon-General's Office August 29, 1882.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Copyists.					
151	Priscilla Hebb	$900	Dec. 1, 1881	Nov. 30, 1882	$900 00	District of Columbia.
152	Anne C. Knight	900	do	do	900 00	Massachusetts.
153	Marian Goondall	900	do	do	900 00	District of Columbia.
154	M. H. Fillebrown	900	do	do	900 00	Do.
155	Harriet Chur	900	do	do	900 00	Pennsylvania.
156	Lizzie P. Roy	900	do	do	900 00	District of Columbia.
157	Jennie B. Jones	900	do	do	900 00	Do.
158	Ellen H. Sheldon	900	do	do	900 00	New York.
159	Eliza C. Bull	900	do	do	900 00	District of Columbia.
160	Annie G. Davis	900	do	do	900 00	Do.
161	Victoria J. Le Compte	900	do	do	900 00	Do.
162	Annie Harding	900	do	do	900 00	Maine.
163	Nettie E. George	900	do	do	900 00	District of Columbia.
164	Edmonia S. Crawford	900	do	do	900 00	Virginia.
165	Eliza Wilkes	900	do	do	900 00	District of Columbia.
166	Mary Mitchell	900	do	do	900 00	Kentucky.
167	Clara T. Emory	900	do	do	900 00	District of Columbia.
168	Annie C. Wyeth	900	Apr. 28, 1882	do	530 78	Do.
169	Carrie S. Gillem	900	June 8, 1882	do	429 40	Tennessee.
170	Jennie Lawson	900	Aug. 28, 1882	do	142 66	Massachusetts.
171	Thomas J. Abbott *a*	900	Dec. 1, 1881	June 6, 1882	569 79	Virginia.
172	E. C. Lancaster	900	Aug. 5, 1882	Nov. 30, 1882	286 95	District of Columbia.
173	Elizabeth F. Long	900	do	do	286 95	Do.
174	Mary L. Mauger	900	do	do	286 95	Pennsylvania.
175	Annie E. Loomis	900	do	do	286 95	District of Columbia.
176	Elizabeth W. Owen	900	do	do	286 95	Do.
177	Mary S. Davis	900	do	do	286 95	Do.
178	George Lecomte	900	Aug. 14, 1882	do	250 26	Do.
179	Josephine S. Jarocka	900	Aug. 16, 1882	do	262 49	Do.
180	Florence C. Bleecker	900	Aug. 14, 1882	do	216 03	Do.
181	Jane P. Montgomery	900	Aug. 18, 1882	do	255 15	Do.
182	Emilie M. Hooe	900	Aug. 29, 1882	do	225 82	Do.
	Messenger.					
183	Mary Murray	480	Dec. 1, 1881	Nov. 30, 1882	480 00	District of Columbia.
	Superintendent of building.					
184	George K. Finckel	250	Dec. 1, 1881	Nov. 30, 1882	250 00	District of Columbia.
	Agents for investigation of claims.					
185	Ira B. Dutton	1,400	Aug. 5, 1882	Nov. 30, 1882	445 05	Tennessee.
186	Joseph Livsey	1,400	do	do	754 65	
187	William M. Ekin	1,400	do	do	445 05	Pennsylvania.
188	John F. Dobbyn	1,400	do	do	757 93	Do.
189	A. F. Ickis	1,400	do	do	545 20	
190	Henry E. Fitz	1,400	do	do	628 52	Maine.
191	Henry B. Quimby	1,400	do	do	788 17	
192	Frederick A. Sawyer	1,400	do	do	803 95	Tennessee.
193	Rufus Ingalls, 2d	1,400	do	do	738 25	
194	Alexander R. Speel	1,400	do	do	800 65	Pennsylvania.
195	William G. Rankin	1,400	do	do	864 71	
196	George E. Hoffman	1,400	do	do	509 94	New York.
197	Henry C. Latshaw	1,400	do	do	607 64	Missouri.
198	Alexander Lynch	1,400	do	do	772 44	Iowa.
199	Madison Solladé	1,400	do	do	729 14	Maryland.
200	Matthew A. Woodburn	1,400	do	do	530 20	Pennsylvania.
201	James Putnam	1,400	do	do	429 84	Iowa.
201	Peter Melendy	1,400	do	do	490 62	Do.
203	John A. Chapman	1,400	do	do	496 42	Illinois.
204	Thomas M. Thatcher	1,400	do	do	485 55	West Virginia.
205	John P. Dougherty	1,400	Aug. 14, 1882	do	563 60	Pennsylvania.
206	John S. Cooper	1,400	Aug. 18, 1882	do	562 29	Do.
207	Thomas J. Saunders	1,400	Aug. 5, 1882	do	653 56	Iowa.
208	Arthur T. Reeve	1,400	do	do	394 70	
209	J. F. Leak *b*	1,400	Aug. 14, 1882	Oct. 31, 1882	352 87	
210	Z. F. Nye *c*	1,400	Aug. 6, 1882	Aug. 11, 1882	46 16	

a Thomas J. Abbott, reduced from first-class clerk April 5, 1882, and discharged June 6, 1882.
b J. F. Leak, died October 31, 1882.
c Z. F. Nye, discharged August 11, 1882,

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HEADQUARTERS OF THE ARMY,
INSPECTOR-GENERAL'S OFFICE,
Washington, D. C., December 1, 1882.

SIR: In compliance with War Department circular of the 24th ultimo, I have the honor to forward herewith statement showing names, compensation, &c., of clerks, messengers, &c., employed in this office, from December 1, 1881, to November 30, 1882, inclusive.

Very respectfully, your obedient servant,

D. B. SACKET,
Brigadier and Inspector-General.

Hon. SECRETARY OF WAR.

Statement showing the names, compensation, &c., of clerks, messengers, laborers, and watchmen employed in the office of the Inspector-General, from December 1, 1881, *to November* 30, 1882.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Chief Clerk.					
1	Warren H. Orcutt.....	$1,800	Dec. 1, 1881	Nov. 30, 1882	$1,800 00	Army.
	Class 1.					
2	Charles W. Greene*	1,200	Dec. 1, 1881	Aug. 10, 1882	732 17	Pennsylvania.
			Aug. 11, 1882	Nov. 30, 1882	366 30	
					1,098 47	
	Assistant Messenger.					
3	John Connolly.....	720	Dec. 1, 1881	Nov. 30, 1882	720 00	District of Columbia.

* Pay of a soldier and commutation of allowances.

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, D. C., December 2, 1882.

SIR: I have the honor to transmit herewith a list of persons employed in this office, showing the amount paid to each to November 30, 1882, inclusive, "to carry into effect the various appropriations for rivers and harbors, fortifications, and surveys of military defenses," and paid from such appropriations as provided by the legislative, executive, and judicial appropriation act, approved August 5, 1882.

Very respectively, your obedient servant,

H. G. WRIGHT,
Chief of Engineers, Brig. and B't Maj.-Gen'l.

Hon. ROBERT T. LINCOLN,
Secretary of War.

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List of persons employed in the office of the Chief of Engineers, showing the amount paid to each to November 30, 1882, inclusive, to carry into effect the various appropriations for rivers and harbors, fortifications, and surveys of military defenses.

No.	Name.	Annual salary.	Period of service.		Amount received.	Residence when appointed.
			From—	To—		
	Assistant Engineers.					
1	Thomas J. Lee	$4,200	Aug. 8, 1882	Nov. 30, 1882	$1,318 33	District of Columbia.
2	Richard W. Burgess	3,600	....do	....do	1,130 00	Do.
	Clerks.					
3	Henry R. Conklin	1,800	Aug. 8, 1882	Oct. 31, 1882	415 00	New York.
4	Theodore R. Ditterline	1,400	....do	Nov. 30, 1882	439 44	Pennsylvania.
5	George C. Thomas, jr	1,400	....do	....do	439 44	District of Columbia.
6	Samuel M. Marsh	1,400	....do	....do	439 44	Pennsylvania.
7	Henry A. Curtis	1,400	....do	....do	439 44	Vermont.
8	Sacket Duryee	1,400	....do	....do	439 44	Virginia.
9	William B. Johns	1,400	....do	....do	439 44	District of Columbia.
10	Henry B. King	1,400	....do	....do	439 44	Missouri.
11	Henry E. Randall	1,400	....do	....do	439 44	Minnesota.
12	Miraud W. Saxton	1,200	Aug. 9, 1882	....do	373 33	Massachusetts.
13	J. Hanson Price	1,200	....do	....do	373 33	Virginia.
14	August Schausten	1,200	....do	....do	373 33	Indiana.
15	John D. Schmidt	1,200	....do	....do	373 33	New York.
16	Pliny M. Hough	1,200	....do	....do	373 33	Maryland.
17	Albert Grimes	1,200	Aug. 8, 1882	....do	376 67	District of Columbia.
18	John C. S. Berger	1,200	....do	....do	376 67	
19	Waverly D. Drinkard	1,080	Aug. 9, 1882	....do	336 00	District of Columbia.
20	William H. Watson	1,080	....do	....do	336 00	Maryland.
21	William D. Jones	1,080	....do	....do	336 00	Nebraska.
22	Eugene J. Williams	1,080	Sept. 1, 1882	....do	270 00	New York City.
23	Lucian Garner	1,080	....do	....do	270 00	District of Columbia.
24	Robert Sillers	1,000	Aug. 8, 1882	....do	313 90	Do.
	Copyist.					
25	Sarsfield A. McCarthy	720	Nov. 1, 1882	Nov. 30, 1882	60 00	District of Columbia.
	Draughtsmen.					
26	John Ober	1,800	Aug. 8, 1882	Nov. 30, 1882	565 00	District of Columbia.
27	William W. Winship	1,800	....do	....do	565 00	Do.
28	Denis Callahan	1,800	....do	....do	565 00	Do.
29	John S. Winship	1,800	....do	....do	565 00	Do.
30	Charles G. Crebs	1,800	....do	....do	565 00	Maryland.
31	Martin Altschuh	1,400	....do	....do	439 44	Pennsylvania.
32	Joel R. P. Mechlin	1,200	....do	....do	376 67	District of Columbia.
33	Franz von Schilling	1,080	Aug. 9, 1882	....do	336 00	Virginia.
34	George Ritter	1,080	....do	....do	336 00	District of Columbia.
35	Albert N. Ober	1,000	Aug. 8, 1882	....do	313 90	Do.
	Mechanic.					
36	William H. Deckman	1,000	Aug. 9, 1882	Nov. 30, 1882	311 12	District of Columbia.
	Assistant Messengers.					
37	Charles Haerle	720	Aug. 9, 1882	Nov. 30, 1882	224 00	District of Columbia.
38	William H. Montague	720	Aug. 8, 1882	....do	226 00	Massachusetts.
39	William J. Lee	720	Aug. 9, 1882	....do	224 00	Virginia.
	Skilled Laborers.					
40	John A. Jewell	720	Aug. 8, 1882	Nov. 30, 1882	226 00	District of Columbia.
41	John C. Williamson	720	....do	....do	226 00	New Jersey.

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OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, D. C., December 2, 1882.

SIR: I have the honor to transmit herewith, as required by section 194 Revised Statutes, a statement showing the names, compensation, &c., of clerks, messengers, and laborers employed in this office from December 1, 1881, to November 30, 1882.

Very respectfully, your obedient servant,

H. G. WRIGHT,
Chief of Engineers, Brig. and Bvt. Maj. Gen.

Hon. ROBERT T. LINCOLN,
Secretary of War.

Statement showing names, compensation, &c., of clerks, messengers, and laborers employed in the office of the Chief of Engineers, United States Army, from December 1, 1881, to November 30, 1882.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Chief Clerk.					
1	William J. Warren	$2,000	Dec. 1, 1881	Nov. 30, 1882	$2,000 00	New York.
	Class 4.					
2	George T. Woodward	1,800	Dec. 1, 1881	Nov. 30, 1882	1,800 00	District of Columbia.
3	William A. Anderson	1,800	....do	....do	1,800 00	Indiana.
4	Phineas J. Dempsey	1,800	....do	....do	1,800 00	Virginia.
5	Charles G. Love	1,800	....do	....do	1,800 00	New York.
	Class 3.					
6	James Eveleth	1,600	Dec. 1, 1881	Nov. 30, 1882	1,600 00	District of Columbia.
7	F. J. Willoughby	1,600	....do	....do	1,600 00	New Hampshire.
	Class 2.					
8	Francis N. Barbarin	1,400	Dec. 1, 1881	Nov. 30, 1882	1,400 00	New Jersey.
9	Waldemar Jansen	1,400	....do	....do	1,400 00	New York.
10	John M. Jewell	1,400	....do	....do	1,400 00	Pennsylvania.
	Class 1.					
11	Henry B. King	1,200	Dec. 1, 1881	Aug. 7, 1882	823 92	Missouri.
12	Marion T. Anderson	1,200	....do	Nov. 30, 1882	1,200 00	Iowa.
13	John J. Barnard	1,200	....do	....do	1,200 00	District of Columbia.
14	Henry E. Smith	1,200	Aug. 9, 1882	....do	372 82	Ohio.
	$1,000 Class.					
15	Henry E. Randall	1,000	Dec. 1, 1881	Aug. 7, 1882	687 26	Minnesota.
16	Joseph S. Moss	1,000	Aug. 9, 1882	Nov. 30, 1882	310 02	Vermont.
	Assistant Messenger.					
17	James A. D. Green	720	Dec. 1, 1881	Nov. 30, 1882	720 00	District of Columbia.
	Laborers.					
18	Fred. C. Hartmann	660	Dec. 1, 1881	Nov. 30, 1882	660 00	District of Columbia.
19	Francis E. Northhous	660	....do	Aug. 26, 1882	485 44	California.
20	Charles W. Franklin	660	Sept. 1, 1882	Nov. 30, 1882	163 80	District of Columbia.

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WAR DEPARTMENT,
PUBLICATION OFFICE, WAR RECORDS 1861–'65,
Washington, December 4, 1882.

SIR: I have the honor to transmit herewith a statement showing the names, compensation, &c., of clerks, messengers, laborers, &c., employed in the War Records office from December 1, 1881, to November 30, 1882.

Very respectfully, your obedient servant,

ROBERT N. SCOTT,
Brevet Lieutenant-Colonel, U. S. A.

The SECRETARY OF WAR.

Statement showing the names, compensation, &c., of agent, clerks, copy-holders, copyists, printers, messengers, watchmen, and laborer employed in the War Records office from December 1, 1881, *to November* 30, 1882.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Agent.					
1	Marcus J. Wright*	$2,000	Dec. 1, 1881	Nov. 30, 1882	$2,232 00	Tennessee.
	Class 4.					
2	John S. Moody	1,800	Dec. 1, 1881	Nov. 30, 1882	1,800 00	Ohio.
3	Edwin J. Harvie	1,800	....do	....do	1,800 00	Virginia.
	Class 3.					
4	F. Collins Smith	1,600	Dec. 1, 1881	Nov. 30, 1882	1,600 00	Maryland.
5	Joseph Darr†	1,600	Apr. 10, 1882	....do	898 29	Ohio.
	Class 2.					
6	Benjamin S. Platt	1,400	Dec. 1, 1881	Nov. 30, 1882	1,400 00	New York.
	Class $1,000.					
7	Virginia E. Dade	1,000	Dec. 1, 1881	Nov. 30, 1882	1,000 00	Kentucky.
8	Sarah H. Purcell	1,000	....do	Nov. 30, 1882	1,000 00	Army.
	Copy-holders.					
9	Jessie C. Johns	900	Dec. 1, 1881	Nov. 30, 1882	900 00	Minnesota.
10	Ida R. Morris‡	900	....do	....do	852 44	Texas.
	Copyists.					
11	Jennie C. Hoffar	840	Dec. 1, 1881	Nov. 30, 1882	840 00	District of Columbia.
12	Mary E. Weeks	840	....do	....do	840 00	Do.
13	Maria Thomas	840	....do	....do	840 00	Do.
14	Virginia F. Whalin	840	....do	....do	840 00	Iowa.
15	Martha E. Gilmer	840	....do	....do	840 00	Mississippi.
16	Annie E. Byus	840	....do	....do	840 00	Maryland.
17	Mary E. Lee	840	....do	....do	840 00	Illinois.
18	Ella W. Daniels	840	....do	....do	840 00	Michigan.
19	Caroline E. Bachelder	840	....do	....do	840 00	Alabama.
20	Pamphila S. Wolcott	840	....do	....do	840 00	Ohio.
21	Mary E. Davison	840	....do	....do	840 00	Alabama.
22	Mary A. Fisher	840	....do	....do	840 00	Nebraska.
22	Bennina M. Bartlett	840	....do	....do	840 00	Mississippi.
24	Emma Leckie	840	....do	....do	840 00	District of Columbia.
25	Marie A. Wilson	840	....do	....do	840 00	Iowa.
26	Joanna W. Turner	840	....do	....do	840 00	Wisconsin.
27	Emilie C. Chase	840	....do	....do	840 00	Minnesota.
28	J. De C. Thomas	840	Oct. 3, 1882	....do	135 44	California.

* Reduced from $2,400 to $2,000 per annum July 1, 1882.
† Promoted from Class 1 to Class 3 August 5, 1882.
‡ Promoted from $840 to $900 per annum September 16, 1882.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	PRINTING OFFICE.					
	Foreman.					
29	John N. Bovee	$1,600	Dec. 1, 1881	Nov. 30, 1882	$1,600 00	Pennsylvania.
	Pressman.					
30	Alfred C. Shaw	1,200	Dec. 1, 1881	Nov. 30, 1882	1,200 00	District of Columbia.
	Compositors.					
31	William Ricketts	1,000	Dec. 1, 1881	Nov. 30, 1882	1,000 00	District of Columbia.
32	E. J. Gray	1,000	....do	....do	1,000 00	Ohio.
33	Samuel J. Armstrong	1,000	... do	....do	1,000 00	Pennsylvania.
34	Frank W. Fletcher	1,000	Apr. 19, 1882	....do	616 55	Illinois.
35	H. G. Ellis	1,000	June 8, 1882	....do	479 19	Vermont.
	Assistant Messengers.					
36	Charles Keegin*	720	Dec. 1, 1881	Nov. 30, 1882	658 52	District of Columbia.
37	Thomas McFadden	720	....do	....do	720 00	New York.
38	Thomas E. Liday	720	....do	....do	720 00	District of Columbia.
	Watchmen.					
39	Erastus Thatcher	720	Dec. 1, 1881	Nov. 30, 1882	720 00	Michigan.
40	Frank T. Randolph	720	....do	....do	720 00	New Jersey.
	Laborer.					
41	John P. Morris†	600	Dec. 1, 1881	Nov. 30, 1882	580 00	District of Columbia.

* Absent one month without pay.
† Promoted from $30 to $50 per month January 1, 1882.

WAR DEPARTMENT,
SURGEON-GENERAL'S OFFICE,
Washington, D. C., December 16, 1882.

SIR: I have the honor to submit herewith the report required by section 194, Rev. Stat., showing the names of clerks and other persons employed in the office of the Surgeon-General from December 1, 1881, to November 30, 1882, the time each person was actually employed, the amount paid each, and residence at time of appointment.

The entire force of this office has been usefully employed during the year, and the removal of none is at present recommended among the regular force. The qualifications of those appointed on probation will be reported from time to time as may be necessary.

Very respectfully, your obedient servant,

C. H. CRANE,
Surgeon-General, U. S. Army.

HON. SECRETARY OF WAR.

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Statement showing the names, compensation, &c., of clerks, assistant messengers, watchmen, laborers, &c., employed in the office of the Surgeon-General of the Army from December 1, 1881, to November 30, 1882.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Chief Clerk.					
1	Samuel Ramsey	$2,000	Dec. 1, 1881	Nov. 30, 1882	$2,000 00	Virginia.
	Class 4.					
2	Charles Harling	1,800	Dec. 1, 1881	Nov. 30, 1882	1,800 00	Army.
3	John Wilson	1,800	....do	....do	1,800 00	Do.
4	Clemens J. Myers	1,800	....do	....do	1,800 00	New York.
5	Myron L. Baxter	1,800	....do	....do	1,800 00	Illinois.
6	Sidney A. Monlthrop	1,800	....do	....do	1,800 00	Connecticut.
7	Edward Shaw	1,800	....do	....do	1,800 00	Massachusetts.
8	Joseph R. Rose	1,800	....do	....do	1,800 00	New York.
9	Jacob Frech	1,800	....do	....do	1,800 00	District Columbia.
	Class 3.					
10	Joseph F. Loughran	1,600	Dec. 1, 1881	Nov. 30, 1882	1,600 00	New York.
11	Adolph Rechenberg	1,600	....do	....do	1,600 00	Army.
12	Frederick L. Apel	1,600	....do	Aug. 4, 1882	951 15	Pennsylvania.
			Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,464 98	
13	William Fisher	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	Army.
		1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,327 96	
14	Matthew H. Teulon	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	Massachusetts.
		1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,327 96	
15	E. Scott McCleary	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	Pennsylvania.
		1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,327 96	
	Class 2.					
16	William S. McPherson	1,400	Dec. 1, 1881	Nov. 30, 1882	1,400 00	District of Columbia.
17	Lorenz Auber	1,200	... do	Aug. 4, 1882	814 13	Army.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 86	
					1,262 99	
18	Anton Becker	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	Do.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 86	
					1,262 99	
19	William Palmer	1,200	Dec. 1, 1881	Aug. 4, 1882	814,13	Do.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 86	
					1,262 99	
20	William C. Myers	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	Pennsylvania.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 86	
					1,262 99	
21	John M. Nesbitt	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	New York.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 86	
					1,262 99	
22	Thomas O'Beirne	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	Massachusetts.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 86	
					1,262 99	
23	Peter Preuss	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	New York.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 86	
					1,262 99	

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Class 2—Continued.					
24	Edward S. Fletcher	$1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	$814 13 448 86	Pennsylvania.
					1,262 99	
	Class 1.					
25	Charles Abert	1,200	Dec. 1, 1881	Nov. 30, 1882	1,200 00	Maryland.
26	Arthur D. Addison	1,000 1,200	...do ..... Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86	Do.
					1,064 97	
27	Osborne Ashley	1,000 1,200	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86	Illinois.
					1,064 97	
28	William S. Ballard	(*) 1,200	Dec. 1, 1881 Aug. 12, 1882	Aug. 11, 1882 Nov. 30, 1882	894 47 363 04	New York.
					1,257 51	
29	Samuel P. Banes	1,000 1,200	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86	Pennsylvania.
					1,064 97	
30	Charles R. Barker	1,000 1,200	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86	Massachusetts.
					1,064 97	
31	Archibald Brown	1,000 (*) 1,200	Dec. 1, 1881 July 6, 1882 Aug. 12, 1882	July 5, 1882 Aug. 11, 1882 Nov. 30, 1882	597 59 111 54 363 04	District of Columbia.
					1,072 17	
32	Edmund H. Brown	(*) 1,200	Dec. 1, 1881 Apr. 11, 1882	Apr. 10, 1882 Nov. 30, 1882	547 52 767 03	Do.
					1,314 55	
33	George W. Bencker	1,000 1,200	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86	Do.
					1,064 97	
34	Thomas W. Burke	1,000 1,200	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86	Michigan.
					1,064 97	
35	Ward B. Burnett	1,000 1,200	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86	New York.
					1,064 97	
36	Mark Burnham	(*) 1,200	Dec. 1, 1881 Aug. 12, 1882	Aug. 11, 1882 Nov. 30, 1882	822 25 363 04	Ohio.
					1,185 29	
37	Hugh R. Butler	1,200	Sept. 13, 1882	Nov. 30, 1882	258 70	Indiana.
38	Thomas P. Buxton	1,000 1,200	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86	New York.
					1,064 97	
39	Henry S. Byington	1,000 1,200	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86	Connecticut.
					1,064 97	

* Pay of a soldier and commutation of allowances.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Class 1—Continued.					
40	Elbridge G. Chapman.	$1,000	Dec. 1, 1881	Aug. 4, 1882	$679 11	New York.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
41	Francis P. Cleary.....	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Illinois.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
42	Joseph W. Conard....	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Pennsylvania.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
43	William B. Corbit.....	1,200	Dec. 1, 1881	July 17, 1882	755 43	District of Columbia.
44	Reuben Cox	1,000	....do	Aug. 4, 1882	679 11	Kansas.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
45	George D. Cudlip	(*)	Dec. 1, 1881	Aug. 11, 1882	789 43	District of Columbia.
		1,200	Aug. 12, 1882	Nov. 30, 1882	363 04	
					1,152 47	
46	John H. Cutter	(*)	Dec. 1, 1881	Aug. 11, 1882	823 90	Ohio.
		1,200	Aug. 12, 1882	Nov. 30, 1882	363 04	
					1,186 94	
47	Bennet J. Denson.....	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	New York.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
48	Addison Dent.....	1,000	Dec. 1, 1881	Aug. 4, 1882	679, 11	District of Columbia.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
49	Charles Dimmitt.....	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Do.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
50	James H. Dony.....	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Nebraska.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
51	George J. Drew.....	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Kansas.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
52	William L. Drury	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	California.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
53	John N. Ehle	1,200	Dec. 1, 1881	Nov. 30, 1882	1,200 00	Wisconsin.
54	J. LeRoy Farden.....	(*)	....do	Aug. 11, 1882	749 84	Alabama.
		1,200	Aug. 12, 1882	Nov. 30, 1882	363 04	
					1,112 88	
55	Henry B. Fay.....	1,000	May 8, 1882	Aug. 4, 1882	243 46	Maine.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					629 32	

* Pay of a soldier and commutation of allowances.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Class 1—Continued.					
56	Roswell W. Fish	$1,000	Dec. 1, 1881	Aug. 4, 1882	$679 11	Connecticut.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
57	Oscar Foote	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Indiana.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
58	Samuel W. Forrest	(*)	Dec. 1, 1881	Aug. 11, 1882	752 55	Do.
		1,200	Aug. 12, 1882	Nov. 30, 1882	363 04	
					1,115 59	
59	Alfred French	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Ohio.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
60	Alpheus P. French	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Alabama.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
61	Smith D. Fry	1,200	Dec. 1, 1881	June 30, 1882	700 00	Iowa.
62	Alfred H. Gawler	(*)	....do	....do	856 65	District of Columbia.
		1,200	July 6, 1882	Nov. 30, 1882	486 95	
					1,343 60	
63	Julius Georgii	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Minnesota.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
64	William R. Goodman	1,200	Dec. 1, 1881	Nov. 30, 1882	1,200 00	Maryland.
65	Leonard K. Graves	1,000	.... do .	Aug. 4, 1882	679 11	New Hampshire.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
66	William Guilford, jr	(*)	Dec. 1, 1881	Aug. 11, 1882	794 67	Maryland.
		1,200	Aug. 12, 1882	Nov. 30, 1882	363 04	
					1,157 71	
67	Francis P. Hallowell	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Kansas.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
68	Robert J. Harlan	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Kentucky.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
69	John A. Hasson	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Delaware.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
70	Isaac Hawling	(*)	Dec. 1, 1881	Aug. 11, 1882	883 61	Virginia.
		1,200	Aug. 12, 1882	Nov. 30, 1882	363 04	
					1,246 65	
71	George Henderson	1,000	Mar. 16, 1882	June 26, 1882	283 45	West Virginia.
		(*)	June 27, 1882	Aug. 11, 1882	134 18	
		1,200	Aug. 12, 1882	Nov. 30, 1882	363 04	
					780 67	

*Pay of a soldier and commutation of allowances.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Class 1—Continued.					
72	William D. Henry....	$1,000 1,200	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	$679 11 385 86 1,064 97	Virginia.
73	William W. Hibbard .	1,000 1,200	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86 1,064 97	New York.
74	Thomas B. Higgins...	1,000 1,200	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86 1,064 97	District of Columbia.
75	Rupert G. Hill.....	1,000 1,200	Dec. 1, 1851 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86 1,064 97	California.
76	Samuel Hilton	1,200	Dec. 1, 1881	Aug. 25, 1882	679 35	Rhode Island.
77	Samuel N. Hilton.....	1,000 1,200	....do ..... Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86 1,064 97	Arkansas.
78	William S. Houghton .	1,000 1,200	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86 1,064 97	Massachusetts.
79	James H. Howard	1,200	Dec. 1, 1881	....do	1,200 00	Maryland.
80	Henry W. Hurley	1,000 1,200	....do ..... Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86 1,064 97	Missouri.
81	Thomas Hynes	1,200	Dec. 1, 1881	June 20, 1882	667 03	Do.
82	Thomas H. Janvier ..	(*) 1,200	..do ..... Aug. 12, 1882	Aug. 11, 1882 Sept. 1, 1882	977 54 68 48 976 02	District of Columbia.
83	Charles M. Kalloch...	1,000 1,200	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86 1,064 97	Maine.
84	Andrew Kalstrom	1,000 1,200	Dec. 1, 1881 Aug. 5, 1881	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86 1,064 97	Illinois.
85	William H. Kean	1,000 1,200	Jan. 25, 1882 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	528 44 385 86 914 30	New York.
86	James V. Kearney....	1,000 1,200	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86 1,064 97	Illinois.
87	Ellis W. Kepner	1,200	Dec. 1, 1881	Dec. 31, 1881	100 00	Pennsylvania.
88	Nathan E. King.....	1,000 1,200	....do ..... Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86 1,064 97	Kentucky.

* Pay of a soldier and commutation of allowances.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Class 1—Continued.					
89	Frederick Knoop	$1,000	Dec. 1, 1881	June 6, 1882	$100 67	District of Columbia.
		(*)	Jan. 7, 1882	Aug. 11, 1882	637 31	
		1,200	Aug. 12, 1882	Nov. 30, 1882	363 04	
					1,101 02	
90	William M. Lay	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Maryland.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
91	Louis Leclerc	1,000	Dec. 1, 1881	May 29, 1882	594 50	Pennsylvania.
92	George A. Leech	1,200	....do	Nov. 30, 1882	1,200 00	Iowa.
93	Thomas H. Lewis	(*)	....do	Aug. 11, 1882	755 08	Nevada.
		1,200	Aug. 12, 1882	Nov. 30, 1882	363 04	
					1,118 12	
94	John McLean Lipscomb.	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Virginia.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
95	Frederick B. Loftus	1,200	Dec. 1, 1881	Nov. 30, 1882	1,200 00	New York.
96	T. Bruce McFalls	1,000	....do	Aug. 4, 1882	679 11	District of Columbia.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
97	Edwin K. McKeever	(*)	Dec. 1, 1881	Aug. 11, 1882	771 68	Pennsylvania.
		1,200	Aug. 12, 1882	Nov. 30, 1882	363 04	
					1,134 72	
98	Christopher Mead	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Massachusetts.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
99	Stephen C. Miller	(*)	Dec. 1, 1881	July 31, 1882	778 15	Minnesota.
		1,200	Aug. 1, 1882	Nov. 30, 1882	398 91	
					1,177 06	
100	Jacob G. Moore	1,000	Dec. 1, 1881	June 2, 1882	507 07	District of Columbia.
		1,200	Aug. 12, 1882	Nov. 30, 1882	363 04	
					870 11	
101	Samuel A. Muhleman	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	West Virginia.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
102	Frank D. Neale	1,200	Sept. 15, 1882	... do	252 17	Wisconsin.
103	Joshua Nicholls	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Georgia.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
104	Charles C Noonan	1,000	Dec. 1, 1881	Aug. 2, 1882	673 67	New York.
		(*)	Aug. 3, 1882	Aug. 11, 1882	26 53	
		1,200	Aug. 12, 1882	Nov. 30, 1882	363 04	
					1,063 24	
105	Charles A. Norton	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Maine.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	

* Pay of a soldier and commutation of allowances.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Class 1—Continued.					
106	Patrick O'Hagan	$1,000 1,200	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	$679 11 385 86 1,064 97	District of Columbia
107	John L. Owens	(*) 1,200	Dec. 1, 1881 Aug. 12, 1882	Aug. 11, 1882 Nov. 30, 1882	749 84 363 04 1,112 88	Do.
108	Edwin T. Parker	1,200	Dec. 1, 1881	Apr. 3, 1882	409 89	New Hampshire.
109	Charles H. Pennington	1,200	Sept. 14, 1882	Nov. 30, 1882	255 43	Texas.
110	Charles A. Perkins	1,200	Dec. 1, 1881	....do	1,200 00	District of Columbia
111	Charles W. Petersen	(*) 1,200	....do Aug. 12, 1882	Aug. 11, 1882 Nov. 30, 1882	757 62 363 04 1,120 66	Do.
112	Horace Piper	1,000 1,200	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86 1,064 97	Maine.
113	Walter Procter	1,200	Dec. 1, 1881	....do	1,200 00	Navy.
114	Edward G. Randall	1,000 1,200	....do Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86 1,064 97	Pennsylvania.
115	John F. Reardon	1,200	Dec. 1, 1881	... do	1,200 00	Ohio.
116	James Richardson	1,200	....do	.. do	1,200 00	District of Columbia.
117	Alphonso P. Rogers	1,000 1,200	....do Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86 1,064 97	Minnesota.
118	David W. Rousaville	1,000 1,200	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86 1,064 97	Maryland.
119	Henry N. Rothery	1,000 1,200	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86 1,064 97	New York.
120	James W. Sands	1,000 1,200	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86 1,064 97	Ohio.
121	Martin Slough	(*) 1,200	Dec. 1, 1881 Aug. 12, 1882	Aug. 11, 1882 Nov. 30, 1882	799 38 363 04 1,162 42	Do.
122	Harry J. Smith	1,000 1,200	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86 1,064 97	District of Columbia
123	George W. Smoot	1,000 1,200	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86 1,064 97	Maryland.
124	Reinhold Springsguth	1,000 1,200	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 385 86 1,064 97	New York.

*Pay of a soldier and commutation of allowances.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Class 1—Continued.					
125	Charles M. Staley	$1,000	Jan. 9, 1882	Aug. 4, 1882	$572 89	Illinois.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					958 75	
126	James M. Stewart	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Massachusetts.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
127	Clement S. Stull	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	District of Columbia.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
128	Edwin H. Tabler	1,200	Dec. 1, 1881	... do	1,200 00	Do.
129	Oliver P. Temple	1,000	....do	Aug. 4, 1882	679 11	Tennessee.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
130	George P. Tenney	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	New Hampshire.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
131	Frank W. Test	1,200	Aug. 12, 1882	....do	363 04	Illinois.
132	Hugh. W. Throckmorton.	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Virginia.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
133	Decatur B. Treadway	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Kentucky.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
134	Charles Trought	1,200	Dec. 1, 1881	....do	1,200 00	Army.
135	Septimus N. Tustin	(*)	....do	Aug. 11, 1882	773 11	Delaware.
		1,200	Aug. 12, 1882	Aug. 17, 1882	19 57	
					792 68	
136	James A. Wagner	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Illinois.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
137	Eugene Wells	(*)	Dec. 1, 1881	Aug. 11, 1882	803 49	Missouri.
		1,200	Aug. 12, 1882	Nov. 30, 1882	363 04	
					1,166 53	
138	John M. R. Welsh	1,200	Dec. 1, 1881	....do	1,200 00	District of Columbia.
139	George A. Wight	1,000	....do	Aug. 4, 1882	679 11	Maine.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
140	Theodore F. Willsey	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	California.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
	Clerks at $1,000 per annum.					
141	Oliver M. Atwood	1,000	Aug. 15, 1882	Nov. 30, 1882	293 72	Illinois.
142	Robert M. Bagby	1,000	Sept. 15, 1882	....do	209 48	Virginia.
143	Harry B. Bayly	1,000	Dec. 1, 1881	Apr. 18, 1882	383 45	Illinois.

* Pay of a soldier and commutation of allowances.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Clerks at $1,000 per annum—Continued.					
144	Seward S. Beach	$1,000	Aug. 31, 1882	Nov. 30, 1882	$250 24	Michigan.
145	John J. Beard	1,000	Aug. 22, 1882	....do	274 60	Ohio.
146	Samuel E. Belford	1,000	Aug. 30, 1882	....do	252 95	Pennsylvania.
147	Alexander C. Black	1,000	Sept. 25, 1882	....do	182 30	Indiana.
148	Lorenzo D. Bond	1,000	Dec. 1, 1881	May 17, 1882	463 12	District of Columbia.
		1,000	June 3, 1882	Nov. 30, 1882	492 92	
					956 04	
149	William Bowles	720	Dec. 1, 1881	Aug. 16, 1882	511 95	Army.
		1,000	Aug. 17, 1882	Nov. 30, 1882	288 28	
					800 23	
150	Henry M. Brown	1,000	Aug. 24, 1881	....do	269 26	Tennessee.
151	George Burgess	1,000	Oct. 25, 1882	....do	100 75	New York.
152	Andrew N. Canfield	1,000	Sept. 9, 1882	....do	225 78	Iowa.
153	Raymond F. Cardella	1,000	Aug. 21, 1882	....do	277 41	District of Columbia.
154	Frank W. Carden	1,000	July 3, 1882	....do	410 56	Iowa.
155	Thomas T. Carson	1,000	Aug. 24, 1882	....do	269 26	Tennessee.
156	Peter C. Cheeks	1,000	Aug. 14, 1882	....do	296 43	New York.
157	William E. Colladay	1,000	Dec. 1, 1881	Apr. 27, 1882	408 18	Wisconsin.
158	Charles E. Conant	1,000	....do	July 16, 1882	627 48	Maine.
159	Rose Cuningham	1,000	June 14, 1882	Nov. 30, 1882	462 70	Pennsylvania.
160	Thomas B. Dapray	1,000	Sept. 1, 1882	....do	247 52	South Carolina.
161	Charles A. Darling	1,000	Sept. 7, 1882	....do	231 22	Do.
162	Daniel F. Dayhuff	1,000	July 21, 1882	....do	361 65	Indiana.
163	Alfred de Ronceray	1,000	Dec. 1, 1881	Jan. 31, 1882	170 11	California.
164	Richard J. Donnelly	1,000	Aug. 23, 1882	Nov. 30, 1882	271 98	Missouri.
165	Albert G. Drane	1,000	Sept. 19, 1882	....do	198 61	Georgia.
166	Stephen Duncan	1,000	Sept. 5, 1882	....do	236 65	California.
167	Jacob J. Elias	1,000	Aug. 21, 1882	....do	277 41	Georgia.
168	Neilson Falls	1,000	Aug. 31, 1882	....do	250 24	North Carolina.
169	Homer Fellows	660	Dec. 1, 1881	Aug. 4, 1882	447 77	Missouri.
		1,000	Aug. 5, 1882	Nov. 30, 1882	320 89	
					768 66	
170	Eugene A. Fields	1,000	Sept. 6, 1882	....do	233 93	Illinois.
171	James Fishback	1,000	Dec. 1, 1881	Mar. 7, 1882	267 33	Do.
172	Butler Fitch	1,000	Aug. 7, 1882	Nov. 30, 1882	315 45	New York.
173	Christian A Fleetwood	1,000	Dec. 1, 1881	Aug. 13, 1882	703 57	District of Columbia.
174	William H. French, jr	1,000	....do	Jan. 24, 1882	150 67	Virginia.
175	Richard H. Gilliam	1,000	Aug. 29, 1882	Nov. 30, 1882	255 67	Do.
176	William H. Goucher	1,000	Aug. 31, 1882	....do	250 24	Colorado.
177	Charles F. Grantham	1,000	Apr. 28, 1882	June 10, 1882	120 87	Iowa.
178	Daniel W. Guyon	1,000	Dec. 1, 1881	Mar. 15, 1882	289 56	New York.
179	Isaac N. Hammer	1,000	Aug. 29, 1882	Nov. 30, 1882	255 67	Tennessee.
180	Thomas B. Hardin, jr	1,000	Aug 21, 1882	....do	277 41	Kentucky.
181	George E. Harriss	1,000	Aug. 17, 1882	....do	288 28	Alabama.
182	Jacob A. Harrold	1,000	Apr. 14, 1882	July 6, 1882	230 58	Pennsylvania.
183	John George Hertwig	1,000	Aug. 21, 1882	Nov. 30, 1882	277 41	Missouri.
184	Marion F. Holderman	1,000	Aug. 26, 1882	....do	263 82	Illinois.
185	William F. Horton	1,000	July 7, 1882	....do	399 69	Connecticut.
186	Harry A. Hullfish	1,000	Sept. 5, 1882	....do	236 65	New Jersey.
187	Robert D. Hunter	1,000	Dec. 1, 1881	Apr. 15, 1882	275 21	Ohio.
188	Howard M. Kelley	1,000	Aug. 21, 1882	Nov. 30, 1882	277 41	New Jersey.
189	Dennis M. Kennedy	1,000	Aug. 23, 1882	....do	271 98	District of Columbia.
190	Pierre M. Kennerly	660	Dec. 1, 1881	Aug. 4, 1882	447 77	Texas.
		1,000	Aug. 5, 1882	Nov. 30, 1882	320 89	
					768 66	
191	Andrew J. Laird	1,000	Sept. 1, 1882	Oct. 6, 1882	97 82	Georgia.
192	George Lawrence	1,000	Oct. 13, 1882	Nov. 30, 1882	133 39	Ohio.
193	Joseph C. Lay	1,000	Aug. 31, 1882	....do	250 24	Maryland.
194	Patrick McEneany	720	Dec. 1, 1881	Aug. 4, 1882	488 48	Kansas.
		1,000	Aug. 5, 1882	Nov. 30, 1882	320 89	
					809 37	

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Clerks at $1,000 per annum—Continued.					
195	Beckford Mackey	$1,000	Aug. 25, 1882	Nov. 30, 1882	$266 54	South Carolina.
196	William H. J. Malvin	1,000	Sept. 1, 1882	....do	247 52	Ohio.
197	John N. Manning	1,000	Aug. 24, 1882	....do	269 26	Do.
198	John C. Maxwell	1,000	Aug. 17, 1882	....do	288 28	New York.
199	Silas Merchant	1,000	Sept. 5, 1882	....do	236 65	New Jersey.
200	William H. Neill	1,000	Oct. 10, 1882	....do	141 54	Maryland.
201	Burrows Nelson	1,000	Aug. 21, 1882	....do	277 41	West Virginia.
202	Nathaniel Nesbitt	1,000	Sept. 6, 1882	....do	233 93	Alabama.
203	Fred. K. Nichols	1,000	Sept. 5, 1882	....do	236 65	Vermont.
204	William Overbeck	1,000	Aug. 31, 1882	....do	250 24	Michigan.
205	Runnion M. Patrick	1,000	Sept. 5, 1882	....do	236 65	New York.
206	Louis H. Perley	1,000	Aug. 21, 1882	....do	277 41	Illinois.
207	John W. Phillips	1,000	....do	....do	277 41	Do.
208	John S. Poler	1,000	Sept. 1, 1882	....do	247 52	New York.
209	Allen W. Prather	1,000	Dec. 1, 1881	....do	1,000 00	Indiana.
210	Carlos B. Randall	1,000	Aug. 29, 1882	....do	255 67	Wisconsin.
211	Charles K. Remsberg	1,000	Aug. 23, 1882	....do	271 98	Maryland.
212	William B. Renner	1,000	Aug. 22, 1882	....do	274 69	District of Columbia.
213	Jacob H. Richardson	1,000	Sept. 5, 1882	....do	236 65	Ohio.
214	Edward L. Richmond	1,000	Dec. 1, 1881	June 27, 1882	575 76	Wisconsin.
215	Z. Howe Ripley	1,000	....do	Nov. 30, 1882	1,000 00	Michigan.
216	Andrew R. Sample	1,000	Sept. 13, 1882	Sept. 29, 1882	46 20	Indiana.
217	Charles B. Sayer	1,000	Sept. 11, 1882	Nov. 30, 1882	220 35	Pennsylvania.
218	Joseph S. F. Seasford	1,000	Aug. 29, 1882	....do	255 67	District of Columbia.
219	David Skutsch	1,000	June 29, 1882	....do	421 49	Wisconsin.
220	Arthur St. A. Smith	1,000	Sept. 25, 1882	....do	182 30	Virginia.
221	George M. Smith	1,000	Oct. 10, 1882	....do	141 54	Maryland.
222	John W. Sowden	1,000	Aug. 31, 1882	....do	250 24	Michigan.
223	James T. Sprightley	1,000	Aug. 19, 1882	....do	282 85	Colorado.
224	Abram F. Springsteen	1,000	Sept. 20, 1882	....do	195 89	Indiana.
225	Pierre C. Stevens	1,000	Sept. 23, 1882	....do	187 74	Pennsylvania.
226	A. Murat Strong	1,000	Aug. 22, 1882	....do	274 69	Do.
227	Charles E. Sumner	1,000	Sept. 6, 1882	....do	233 93	Michigan.
228	Moses M. Swan	1,000	Dec. 1, 1881	May 6, 1882	432 90	Maine.
229	Austin C. Sweet	1,000	Aug. 21, 1882	Nov. 30, 1880	277 41	California.
230	W. C. Tilden*	1,000	Sept. 4, 1882	....do	217 63	Vermont.
231	George M. Trimble	1,000	Nov. 13, 1882	....do	49 15	Illinois.
232	Jesse W. Underwood	1,000	Aug. 23, 1882	....do	271 98	Do.
233	Henry C. Upperman	1,000	Sept. 4, 1882	....do	239 37	Maryland.
234	Alexander C. Varela	1,000	Aug. 29, 1882	....do	255 67	California.
235	Henry von der Tann	1,000	Aug. 21, 1882	....do	277 41	Dakota.
236	Benjamin F. Wade	1,000	....do	Oct. 6, 1882	127 71	Georgia.
237	Bernard Wagner	1,000	Sept. 8, 1882	Nov. 30, 1882	228 50	Indiana.
238	Samuel S. H. Washington	1,000	Aug. 29, 1882	....do	255 67	South Carolina.
239	Edwin A. Welsh	1,000	Sept. 7, 1882	....do	231 22	Kentucky.
240	William C. Whitney	1,000	....do	....do	231 22	District of Columbia.
241	Andrew D. Wilcox	1,000	Sept. 1, 1882	....do	247 52	Texas.
242	Seymer C. Wilson	1,000	....do	....do	247 52	Illinois.
243	William Wilson	1,000	Sept. 22, 1882	....do	190 46	Ohio.
244	James M. Wimmer	1,000	Oct. 12, 1882	....do	136 11	Indiana.
245	Robert W. Young	1,000	Sept. 11, 1882	....do	220 35	Wyoming.
	Temporary Clerks.					
246	John J. McGuigan	900	Apr. 1, 1882	May 31, 1882	150 83	Virginia.
247	Jennie L. Monroe	900	May 13, 1882	June 30, 1882	121 15	District of Columbia.
	Anatomist.					
248	Ernest F. Shafhirt	1,600	Dec. 1, 1881	Nov. 30, 1882	1,600 00	Pennsylvania.
	Engineer.					
249	William B. Kimball	1,400	Dec. 1, 1881	Nov. 30, 1882	1,400 00	Connecticut.
	Assistant Messengers.					
250	Samuel Bryant	720	Dec. 1, 1881	Nov. 30, 1882	720 00	District of Columbia.
251	Michael Duffy	720	....do	....do	720 00	New York.
252	John Fogarty	720	....do	....do	720 00	Army.
253	Martin Gannon	720	....do	....do	720 00	Do.
254	Nicholas Gilroy	720	....do	....do	720 00	Rhode Island.
255	John J Hanlon	720	....do	....do	720 00	New York.
256	Joseph P. Harris	720	Aug. 17, 1882	....do	208 05	District of Columbia.
257	Eli Jackson	720	Dec. 1, 1881	....do	720 00	Do.

*On leave of absence, without pay, from September 4 to September 11, 1881.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Assistant Messengers—Continued.					
258	William E. Jones	$720	Dec. 1, 1881	Nov. 30, 1882	$720 00	New York.
259	Joshua Parker	720	....do	....do	720 00	Delaware.
260	James H. Shepard	720	Aug. 17, 1882	....do	208 05	California.
261	Aaron Stern	720	Dec. 1, 1881	... do	720 00	Army.
	Watchmen.					
262	John G. Burkhardt	720	Dec. 1, 1881	Nov. 30, 1882	720 00	District of Columbia.
263	Theobald French	720	.....do	....do	720 00	New York.
264	Patrick Hallern	720	....do	....do	720 00	District of Columbia
265	William McCoy	720	....do	....do	720 00	Pennsylvania.
266	Frederick Neujahr	720	.. do	... do	720 00	Missouri.
	Laborers.					
267	Thomas Adams	660	Sept. 1, 1882	Nov. 30, 1882	163 80	District of Columbia
268	John M. Ashfield	660	Sept. 10, 1882	... do	147 66	Ohio.
269	Jeremiah Collins	660	Sept. 21, 1882	do	127 93	New York.
270	Michael F. Daly	660	Dec. 1, 1881	Dec. 31, 1881	55 00	District of Columbia
271	William Green	660	....do	Nov. 30, 1882	660 00	Do.
272	George Hearns	660	Sept. 2, 1882	....do	162 00	Do.
273	Carl Krauso	660	Sept. 22, 1882	....do	126 14	Do.
274	George W. Parris	660	Jan. 1, 1882	Sept. 7, 1882	453 75	Ohio
275	Henry Schmidt	660	Sept. 12, 1882	Nov. 30, 1882	144 07	New York
276	Peter Thomas	660	Aug. 21, 1882	....do	183 53	Virginia.
277	Thomas B. Warrick	660	Sept. 13, 1882	... do	142 28	Do
	Superintendent of building on Tenth street.					
278	Alfred H. Gawler	250	Dec. 1, 1881	Nov. 30, 1882	250 00	District of Columbia
	ADDITIONAL FORCE.					
	Class 4.					
279	Oliphant B. Brown	1,800	Aug. 7, 1882	Nov. 30, 1882	569 02	Iowa.
280	Alonzo M. Buck	1,400	Dec. 1, 1881	Aug. 4, 1882	951 15	Wisconsin.
		1,800	Aug. 5, 1882	Nov. 30, 1882	578 81	
					1,529 96	
281	Cornelius P. Clark	1,400	Dec. 1, 1881	Aug. 4, 1882	951 15	New York.
		1,800	Aug. 5, 1882	Nov. 30, 1882	578 81	
					1,529 96	
282	George E. Corson	1,600	Dec. 1, 1881	Aug. 4, 1882	1,086 17	Maine.
		1,800	Aug. 5, 1882	Nov. 30, 1882	578 81	
					1,664 98	
283	David G. Dixon	1,600	Dec. 1, 1881	Aug. 4, 1882	1,086 17	Pennsylvania.
		1,800	Aug. 5, 1882	Nov. 30, 1882	578 81	
					1,664 98	
284	Harry O. Hall	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	Iowa.
		1,800	Aug. 5, 1882	Nov. 30, 1882	578 81	
					1,392 94	
285	William E Harley	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	Pennsylvania.
		1,800	Aug. 5, 1882	Nov. 30, 1882	578 81	
					1,392 94	
286	George A. Jones	1,400	Dec. 1, 1881	Aug. 4, 1882	951 15	New York
		1,800	Aug. 5, 1882	Nov. 30, 1882	578 81	
					1,529 96	

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Class 4—Continued.					
287	Rudolph Ravenburg	$1,600	Dec. 1, 1881	Aug. 4, 1882	$1,086 17	Wisconsin.
		1,800	Aug. 5, 1882	Nov. 30, 1882	578 81	
					1,664 98	
288	Ruben L. Shimer	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	New Jersey.
		1,800	Aug. 5, 1882	Nov. 30, 1882	578 81	
					1,392 94	
289	Luther W. Slater	1,400	Dec. 1, 1881	Aug. 4, 1882	951 15	Virginia.
		1,800	Aug. 5, 1882	Nov. 30, 1882	578 81	
					1,529 96	
290	Frederick R. Sparks	1,400	Dec. 1, 1881	Aug. 4, 1882	951 15	New York.
		1,800	Aug. 5, 1882	Nov. 30, 1882	578 81	
					1,529 96	
291	Fred. W. Stone	1,600	Dec. 1, 1881	Aug. 4, 1882	1,086 17	Maine.
		1,800	Aug. 5, 1882	Nov. 30, 1882	578 81	
					1,664 98	
292	Benjamin F. Williams	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	New York.
		1,800	Aug. 5, 1882	Nov. 30, 1882	578 81	
					1,392 94	
293	Edward K. Winship	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	Connecticut.
		1,800	Aug. 5, 1882	Nov. 30, 1882	578 81	
					1,392 94	
	Class 3.					
294	Charles R. Clifton	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	Pennsylvania.
		1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,327 96	
295	Charles W. Egan	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	Texas.
		1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,327 96	
296	John C. Fill	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	District of Columbia.
		1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,327 96	
297	George W. Fisher	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	Pennsylvania.
		1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,327 96	
298	Frank J. Foster	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	New York.
		1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,327 96	
299	John F. Gibson	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	Ohio.
		1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,327 96	
300	William Gleason	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	Pennsylvania.
		1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,327 96	
301	Thomas G. Haviland	1,200	Dec. 1, 1881	Aug. 4, 1882	814 13	New York.
		1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,327 96	

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Class 3—Continued.					
302	Felix C. Holland	$1,200 1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	$814 13 513 83 1,327 96	Pennsylvania.
303	Jeremiah R. Imbrie	1,200 1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 513 83 1,327 96	Do.
304	Samuel Johnston	1,200 1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 513 83 1,327 96	Washington T.
305	Magnus Koechling	1,200 1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 513 83 1,327 96	Maryland.
306	James F. Linden	1,200 1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 513 83 1,327 96	Pennsylvania.
307	James C. McConnell	1,200 1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 513 83 1,327 96	Ohio.
308	Thomas L. Miller	1,200 1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 513 83 1,327 96	Massachusetts.
309	Clinton Parkinson	1,200 1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 513 83 1,327 96	Texas.
310	William Pittis	1,200 1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 513 83 1,327 96	Army.
311	Charles Roller	1,200 1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 513 83 1,327 96	Maryland.
312	Ernst Schmid	1,200 1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 513 83 1,327 96	Army.
313	William Schwennecker	1,400 1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	951 15 513 83 1,464 98	Do.
314	William F. Snyder	1,200 1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 513 83 1,327 96	District of Columbia.
315	William E. Spedden	1,200 1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 1, 1879	814 13 513 83 1,327 96	Maryland.
316	Frederick W. Storch	1,400 1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	951 15 513 83 1,464 98	Army.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Class 3—Continued.					
317	William H. Stuard	$1,200 1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	$814 13 513 83	Pennsylvania.
					1,327 96	
318	Albert G. Yount	1,200 1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 513 83	Do.
					1,327 96	
319	Bogislav Zglinitzki	1,200 1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 513 83	District of Columbia.
					1,327 96	
	Class 2.					
320	Louis P. Attschu	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	Kansas.
					1,262 99	
321	Major W. Baylis	1,000 (*) 1,200 1,400	Dec. 1, 1881 Apr. 11, 1882 June 27, 1882 Aug. 5, 1882	Apr. 10, 1882 June 26, 1882 Aug. 4, 1882 Nov. 30, 1882	361 47 225 58 127 32 448 86	Rhode Island.
					1,163 23	
322	Calvin W. Brown	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	Ohio.
					1,262 99	
323	Benjamin W. Browne	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	Florida.
					1,262 99	
324	Mathew Bryan	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	Army.
					1,262 99	
325	Thaddeus S. Buchanan	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	Pennsylvania.
					1,262 99	
326	Walter Cadman	1,200 1,400	June 3, 1882 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	206 44 448 86	District of Columbia.
					655 30	
327	Charles C. Casey	1,400	....do	....do	448 86	Pennsylvania.
328	Monroe G. Chew	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	Mississippi.
					1,262 99	
329	William E. Childs	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	Ohio.
					1,262 99	
330	Cecil Clay	(*) 1,200 1,400	Dec. 1, 1881 Jan. 7, 1882 Aug. 5, 1882	Jan. 6, 1882 Aug. 4, 1882 Nov. 30, 1882	176 21 694 13 448 86	West Virginia.
					1,319 20	
331	Robert L. Clear	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	District of Columbia.
					1,262 99	

* Pay of a soldier and commutation of allowances.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Class 3—Continued.					
332	William E. Covert	$1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov 30, 1882	$814 13 448 86	Kentucky.
					1,262 99	
333	William Crompton	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	Minnesota.
					1,262 99	
334	William H. Degges	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	Texas.
					1,262 99	
335	George M. Dowe	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	Army.
					1,262 99	
336	Horace W. Durnall	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	Pennsylvania.
					1,262 99	
337	David Flynn	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	Army.
					1,262 99	
338	Gustav W. Furcron	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	Pennsylvania.
					1,262 99	
339	Adam Geib	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	District of Columbia.
					1,262 99	
340	Ira Gordon	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	Ohio.
					1,262 99	
341	Louis W. Habercom	1,000 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	679 11 448 86	Illinois.
					1,127 97	
342	Stephen C. Hanson	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	New York.
					1,262 99	
343	Robert W. Hardy	1,200 1,400	Dec. 1, 1881 Aug. 5, 1881	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	Iowa.
					1,262 99	
344	James D. Hendley	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	District of Columbia.
					1,262 99	
345	Alfred Hoss	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	Tennessee.
					1,262 99	
346	Edward J. Jennings	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86	New York.
					1,262 99	

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Class 3—Continued.					
347	Joseph J. Kearney.....	$1,400	Aug. 19, 1882	Nov. 30, 1882	$395 60	Illinois.
348	George H. Larcombe..	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86 1,262 99	District of Columbia.
349	Daniel E. Lattimore ..	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86 1,262 99	Indiana.
350	Winborn Lawton	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86 1,262 99	South Carolina.
351	James S. McFarland ..	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86 1,262 99	Pennsylvania.
352	Charles J. Moore	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86 1,162 99	New York.
353	Wilhelm T. W. Moritz.	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86 1,262 99	Alabama.
354	Robert E. Morris*	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	700 00 372 77 1,072 77	Illinois.
355	James W. Nightingale..	1,400	Aug. 14, 1882	....do	414 62	Iowa.
356	Isaac P. Noyes.....	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86 1,262 99	Rhode Island.
357	Paul Orpogan.....	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86 1,262 99	South Carolina.
358	Wilson D. Palmer	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86 1,262 99	New York.
359	Luther M. Penfield ...	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86 1,262 99	Connecticut.
360	Benjamin W. Reiss ...	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86 1,262 99	District of Columbia.
361	Lewis H. Rose.....	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86 1,262 99	New York.
362	William A. Ruess.....	1,200 1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 86 1,262 99	Ohio.

*On leave of absence without pay from July 1 to August 24, 1882.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Class 3—Continued.					
363	Matthew Ryan	$1,200 1,400	Dec. 1, 1861 Aug. 5, 1862	Aug. 4, 1862 Nov. 30, 1862	$814 13 448 86 1,262 99	New York.
364	James W. St. Clair	1,200 1,400	Dec. 1, 1861 Aug. 5, 1862	Aug. 4, 1862 Nov. 30, 1862	814 13 448 86 1,262 99	District of Columbia.
365	James Taylor	1,200 1,400	Dec. 1, 1861 Aug. 5, 1862	Aug. 4, 1862 Nov. 30, 1862	814 13 448 86 1,262 99	Maryland.
366	James L. Taylor	1,200 1,400	Dec. 1, 1861 Aug. 6, 1862	Aug. 4, 1862 Nov. 30, 1862	814 13 448 86 1,262 99	Pennsylvania.
367	Charles H. Underwood	1,200 1,400	Dec. 1, 1861 Aug. 5, 1862	Aug. 4, 1862 Nov. 30, 1862	814 13 448 86 1,262 99	Do.
368	Michael E. Urell	1,200 1,400	Dec. 1, 1861 Aug. 5, 1862	Aug. 4, 1862 Nov. 30, 1862	814 13 448 86 1,262 99	New York.
369	Charles Watson	1,200 1,400	Dec. 1, 1861 Aug. 5, 1862	Aug. 4, 1862 Nov. 30, 1862	814 13 448 86 1,262 99	Massachusetts.
370	Charles F. Whiteley	1,200 1,400	Dec. 1, 1861 Aug. 5, 1862	Aug. 4, 1862 Nov. 30, 1862	814 13 448 86 1,262 99	Florida.
371	John A. Wise	1,200 1,400	Dec. 1, 1861 Aug. 5, 1862	Aug. 4, 1862 Nov. 30, 1862	814 13 448 86 1,262 99	District of Columbia.
372	David H. Yount	1,200 1,400	Dec. 1, 1861 Aug. 5, 1862	Aug. 4, 1862 Nov. 30, 1862	814 13 448 86 1,262 99	Pennsylvania.
	Class 1.					
373	Morris L. Ackerman	1,200	Aug. 12, 1862	Nov. 30, 1862	363 04	New Jersey.
374	Mason P. Adams	1,200	Aug. 21, 1862	....do	333 69	New York.
375	Isaac H. Allen	1,200	Aug. 25, 1862	....do	320 65	Illinois.
376	George T. Baxter	1,200	Aug. 22, 1862	....do	330 43	New Jersey.
377	Charles L. Beckwith	1,200	Sept. 6, 1862	....do	280 43	Illinois.
378	Michael M. Bleakmore	1,200	Oct. 10, 1862	....do	170 65	Iowa.
379	Samuel D. Caldwell	1,200	Aug. 21, 1862	Sept. 30, 1862	133 69	Pennsylvania.
380	Fred. G. Calvert	1,200	Aug. 12, 1862	Nov. 30, 1862	363 04	Maryland.
381	Raleigh E. Colston	1,200	Aug. 22, 1862	....do	330 43	Virginia.
382	Frank B. Crosthwaite	1,200	Aug. 21, 1862	....do	333 69	Michigan.
383	John B. Davidson	1,200	Aug. 28, 1862	....do	310 86	District of Columbia.
384	Alanson S. Douglass	1,200	Aug. 21, 1862	....do	333 69	Vermont.
385	Burton Thomas Doyle	1,200	....do	....do	333 69	Tennessee.
386	Howard Edmonds	1,200	Aug. 22, 1862	....do	330 43	District of Columbia.
387	Alexander Fairley	1,000 1,200	May 19, 1862 Aug. 5, 1862	Aug. 4, 1862 Nov. 30, 1862	213 24 385 86 599 10	Do.
388	John H. Fildew	1,200	Sept. 15, 1862	....do	252 17	Michigan.
389	Peter P. Finigan	1,000 1,200	Dec. 1, 1861 Aug. 5, 1862	Aug. 4, 1862 Nov. 30, 1862	679 11 385 86 1,064 97	Virginia.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Class 1—Continued.					
390	Napoleon B. Fithian	$1,200	Aug 22, 1882	Nov. 30, 1882	$330 43	Kansas.
391	T. Fulton Gantt	1,200	do	do	330 43	Nebraska.
392	Matthew Gering	1,200	Sept. 22, 1882	do	229 35	Dakota.
393	Graham L. Gordon	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	District of Columbia.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
394	Charles H. Green	1,000	Feb. 1, 1882	Aug. 4, 1882	509 00	Illinois.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					894 86	
395	George W. Henley	1,200	Sept. 5, 1882	do	284 78	Indiana.
396	Joseph Hertford	1,000	Apr. 19, 1882	Aug. 4, 1882	295 66	Illinois.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					681 52	
397	James W. Hester	1,200	Aug. 16, 1882	do	349 99	District of Columbia.
398	Thomas Hynes	1,200	Oct. 6, 1882	do	183 70	Missouri.
399	Thomas Jewell	1,200	Oct. 5, 1882	do	186 96	Virginia.
400	John Scott Johnson	1,200	Sept. 21, 1882	do	232 61	Kentucky.
401	Joseph Jouy	1,200	Aug. 23, 1882	do	327 17	Illinois.
402	Oliver D. Kinsman	1,200	Aug. 22, 1882	do	330 43	Iowa.
403	William Fay Knox	1,200	Aug. 21, 1882	do	333 69	Colorado.
404	William C. McCauslen	1,200	Aug. 23, 1882	do	327 17	Ohio.
405	John H. McCormick	1,200	Aug. 21, 1882	do	317 39	Illinois.
406	Frank Martin	1,200	Oct. 30, 1882	do	105 43	South Carolina.
407	Charles R. Miller	1,200	Aug. 23, 1882	do	327 17	Ohio.
408	Edward McC. Noel	1,200	Aug. 22, 1882	do	330 43	Missouri.
409	John H. D. Nordeman	1,200	Sept. 8, 1882	do	275 00	Illinois.
410	Hubert E. Noteman	1,200	Sept. 1, 1882	do	297 82	Kansas.
411	James S. Phelps	1,200	Aug. 23, 1882	do	327 17	Vermont.
412	Charles G. Powell	1,200	Sept. 2, 1882	do	294 57	Indiana.
413	Waverly N. Ragland	1,200	Sept. 12, 1882	do	261 96	Virginia.
414	John L. Rea	1,200	Aug. 23, 1882	do	327 17	District of Columbia.
415	James L. Rhodes	1,200	Nov. 20, 1882	do	33 70	Indiana.
416	James Q. Rice	1,200	Sept. 5, 1882	do	284 78	Connecticut.
417	George C Samson	1,200	Sept. 13, 1882	do	258 70	District of Columbia.
418	Herman J. Schultics	1,000	Mar. 8, 1882	Aug. 4, 1882	411 78	Wisconsin.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					797 64	
419	Charles N. Shipley	1,200	Aug. 22, 1882	Nov. 21, 1882	298 00	Maryland.
420	Edgar Speiden	1,200	Sept. 13, 1882	Nov. 30, 1882	258 70	District of Columbia.
421	Wilbur V. K. Spencer	1,200	Aug. 21, 1882	do	333 69	Kansas.
422	George H. Taggard	1,200	Sept. 11, 1882	do	265 22	New Hampshire.
423	Bertis B. Thompson	1,000	Apr. 21, 1882	Aug. 4, 1882	290 16	Indiana.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					676 02	
424	Joseph M. Toland	1,200	Sept. 6, 1882	do	281 52	Pennsylvania.
425	Richard S. Trapier	1,200	Sept. 11, 1882	do	265 22	District of Columbia.
426	John A. Van Doren	1,200	Sept. 4, 1882	do	288 04	Indiana.
427	Pascal W. Vasser	1,200	Aug. 23, 1882	do	327 17	Mississippi.
428	John J. Veazie	1,200	Oct. 10, 1882	do	170 65	Do.
429	Thomas Walker	1,200	Aug. 30, 1882	do	304 34	Alabama.
430	John C. Wall	1,200	Aug. 21, 1882	do	333 69	New York.
431	Cornelius C. Willett	1,200	Aug. 28, 1882	do	310 86	Do.
	Assistant Messengers.					
432	Edward Atkins	660	Dec. 1, 1881	Aug. 4, 1882	447 77	Tennessee.
		720	Aug. 5, 1882	Nov. 30, 1882	231 53	
					679 30	
433	James Greenfield	660	Dec. 1, 1881	Aug. 4, 1882	447 77	District of Columbia.
		720	Aug. 5, 1882	Nov. 30, 1882	231 53	
					679 30	

* On leave without pay from August 23 to August 27, 1882.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Assistant Messengers—Continued.					
434	James H. Murphy	$660	Dec. 1, 1881	Aug. 4, 1882	$447 77	Massachusetts.
		720	Aug. 5, 1882	Nov. 30, 1882	231 53	
					679 30	
435	Richard Osborne	660	Dec. 1, 1881	Aug. 4, 1882	447 77	Virginia.
		720	Aug. 5, 1882	Nov. 30, 1882	231 53	
					679 30	
436	Mahlon Pursel	720	Aug. 21, 1882	Nov. 30, 1882	200 22	Do.
437	William G. Silence	660	Dec. 1, 1881	Aug. 4, 1882	447 77	District of Columbia.
		720	Aug. 5, 1882	Nov. 30, 1882	231 53	
					679 30	
	Watchmen.					
438	John C. Mack	720	Sept. 8, 1882	Nov. 30, 1882	165 00	Pennsylvania.
439	Richard K. Morris	660	Aug. 29, 1882	Sept. 7, 1882	17 93	Connecticut.
		720	Sept. 8, 1882	Nov. 30, 1882	164 35	
					182 28	
440	John Welch	720	Sept. 13, 1882	....do	155 20	Maine.
	Laborers.					
441	Henry Diggs	660	Aug. 25, 1882	Nov. 30, 1882	175 75	District of Columbia.
442	George W. Gayner	660	Aug. 14, 1882	....do	195 48	Do.
443	James R. Harris	660	Aug. 18, 1882	....do	188 90	Mississippi.
444	Cornelius Morgan	660	Sept. 8, 1882	....do	151 25	Virginia.
445	John Parker	660	Aug. 30, 1882	....do	166 78	District of Columbia.
446	Patrick Sweeney	660	Aug. 29, 1882	....do	169 18	Do.
	Superintendent of Building.					
447	John Wilson	250	Aug. 11, 1882	Nov. 30, 1882	76 15	Army.
	IN LIEU OF GENERAL SERVICE, &C.					
	Class 4.					
448	John J. Beardsley	1,800	Aug. 12, 1882	Nov. 30, 1882	544 57	New York.
	Class 1.					
449	J. Thomas Baden	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Maryland.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
450	Christopher C. Collins	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Tennessee.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
451	George E. Kelley	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Massachusetts.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
452	Philander Lucas	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Kansas.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
453	John N. Moulder	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Pennsylvania.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Class 1—Continued.					
454	William H. Outlaw	$1,000	Dec. 1, 1881	Aug. 4, 1882	$679 11	North Carolina.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
455	Spencer J. Willis	1,000	Dec. 1, 1881	Aug. 4, 1882	679 11	Minnesota.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 86	
					1,064 97	
456	Addison F. Andrews	1,000	Sept. 9, 1882	....do	225 78	New York.
457	J. Madison Cutts	1,000	Oct. 21, 1882	... do	111 65	District of Columbia.
458	Matthew Duckworth	1,000	Sept. 22, 1882	... do	190 46	Indiana.
459	Thomas W. Heinline	1,000	Sept. 13, 1882	....do	214 61	Virginia.
460	James T. Hensley	1,000	Oct. 31, 1882	....do	84 48	Ohio.
461	John F. Hinman, jr	1,000	Nov. 23, 1882	... do	21 98	Michigan.
462	Ernest Holtzman	1,000	Oct. 28, 1882	....do	92 63	District of Columbia.
463	Jacob Jacobson	1,000	Sept. 12, 1882	....do	217 63	New York.
464	Edwin R. Johnson	1,000	Sept. 15, 1882	....do	209 48	Rhode Island.
465	William J. Leib	1,000	Sept. 25, 1882	....do	182 30	District of Columbia.
466	Albert M. Noyes	1,000	Oct. 31, 1882	... do	84 48	Do.
467	Arthur Schatz	1,000	Sept. 18, 1882	....do	201 33	Missouri.
468	Hugh L. Taylor	1,000	Sept. 9, 1882	....do	225 78	Tennessee.
	Messenger Boy.					
469	William Myers	360	Aug. 12, 1882	Nov. 30, 1882	108 91	District of Columbia.

WAR DEPARTMENT.
ADJUTANT-GENERAL'S OFFICE,
Washington, December 14, 1882.

SIR: I have the honor to submit herewith a list of names of employés on the rolls of this office, with a statement of the time employed and compensation received during the year ending November 30, 1882, for the report required by section 194, Revised Statutes.

I am, sir, very respectfully, your obedient servant,

R. C. DRUM,
Adjutant-General.

Hon. SECRETARY OF WAR.

Statement showing the names, compensation, &c., of clerks, messengers, assistant messengers, watchmen, and laborers employed in the office of the Adjutant-General of the Army, from December 1, 1881, *to November* 30, 1882.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	REGULAR ROLL.					
	Chief Clerk.					
1	Raphael P. Thian	$2,000	Dec. 1, 1881	Nov. 30, 1882	$2,000 00	New York.
	Class 4.					
2	Max. Bock	1,800	Dec. 1, 1881	Nov. 30, 1882	1,800 00	District of Columbia.
3	Henry S. Brinkerhoff	1,800	.. do	....do	1,800 00	New York.
4	John D. Sabine	1,800	... do	... do	1,800 00	Massachusetts.
5	Charles W. Shelton	1,800	....do	....do	1,800 00	Do.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Class 4—Continued.					
6	Benjamin Engel	$1,800	Dec. 1, 1881	Nov. 30, 1882	$1,800 00	District of Columbia.
7	Charles Brown *a*	1,800	....do Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	1,086 17 578 80 1,664 97	New York.
8	John J. Dermody *a*	1,800	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	1,086 17 578 80 1,664 97	District of Columbia.
9	Joseph W. Kirkley *a*	1,800	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	1,086 17 578 80 1,664 97	Maryland.
10	Oliver W. Longon *a*	1,800	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	1,086 17 578 80 1,664 97	Pennsylvania.
11	Henry C. Wood *a*	1,800	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	1,086 17 578 80 1,664 97	Do.
12	J. William Palmer *b*	1,800	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	951 15 578 80 1,529 95	Minnesota.
	Class 3.					
13	Harvey A. Kohr	1,600	Dec. 1, 1881	Nov. 30, 1882	1,600 00	Pennsylvania.
14	George E. Lowerec	1,600	....do	....do	1,600 00	Maryland.
15	Joseph H. Jochum	1,600	....do	... do	1,600 00	New York.
16	Lawrence J. Bryan	1,600	....do	....do	1,600 00	Do.
17	Justus H. Rathbone	1,600	....do	....do	1,600 00	Maryland.
18	Francis J. Gramlich *b*	1,600	....do Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	951 15 513 83 1,464 98	Do.
19	John McCarthy *b*	1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	951 15 513 83 1,464 98	District of Columbia.
20	Francis B. Heitman *b*	1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	951 15 513 83 1,464 98	Ohio.
21	Frederick T. Wilson *b*	1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	951 15 513 83 1,464 98	Massachusetts.
22	Thomas H. Evans *b*	1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	951 15 513 83 1,464 98	District of Columbia.
23	Frank B. Miller *b*	1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	951 15 513 83 1,464 98	Pennsylvania.
24	Alva R. Tichenor *b*	1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	951 15 513 83 1,464 98	Ohio.

a Promoted from Class 3.

b Promoted from Class 2.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Class 3—Continued.					
25	James R. Gibson *a*	.....	Dec. 1, 1881	Aug. 4, 1882	$951 15	Missouri.
		$1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,464 98	
26	John Bingham *a*	.....	Dec. 1, 1881	Aug. 4, 1882	951 15	Pennsylvania.
		1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,464 98	
27	John W. Brown *a*	.....	Dec. 1, 1881	Aug. 4, 1882	951 15	Maine.
		1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,464 98	
28	Charles F. Keefer *a*	.....	Dec. 1, 1881	Aug. 4, 1882	951 15	Pennsylvania.
		1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,464 98	
29	Gustavus A. Brandt *a*	.....	Dec. 1, 1881	Aug. 4, 1882	951 15	District of Columbia.
		1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,464 98	
	Class 2.					
30	Denis Maher	1,400	Dec. 1, 1881	Nov. 30, 1882	1,400 00	District of Columbia.
31	Frederick H. Smith	1,400	....do	.. do	1,400 00	Wisconsin.
32	John Bussius	1,400	....do	....do	1,400 00	District of Columbia.
33	George W. McKee	1,400	....do	... do	1,400 00	Pennsylvania.
34	John Cameron	1,400	... do	....do	1,400 00	Do.
35	John M. Keogh	1,400	....do	....do	1,400 00	New York.
36	Thomas Haslam	1,400	....do	....do	1,400 00	Pennsylvania.
37	Joseph S. Miller, jr	1,400	.... do	....do	1,400 00	Do.
38	Edmond Cotterill	1,400	....do	... do	1,400 00	District of Columbia.
39	William J. Clendenen	1,400	... do	....do	1,400 00	Maryland.
40	John R. Dickson	1,400	... do	....do	1,400 00	District of Columbia.
41	Benjamin F. Cole	1,400	....do	... do	1,400 00	New York.
42	William A. André	1,400	....do	....do	1,400 00	District of Columbia.
43	Thomas B. Nolan	1,400	....do	....do	1,400 00	Pennsylvania.
44	Hugh Kandler *b*	.....	... do	Jan. 21, 1882	170 00	District of Columbia.
		1,400	Jan. 22, 1882	Nov. 30, 1882	1,204 33	
					1,374 33	
45	Florence Donohue *b*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	New York.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
46	Charles Smith *b*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	District of Columbia.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
47	William G. Spottswood *b*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	Pennsylvania.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
48	John G. Brown *b*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	District of Columbia.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
49	John O'Neill *b*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	Do.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
50	John Lepper *b*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	Maryland.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	

a Promoted from Class 2. *b* Promoted from Class 1.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Class 2—Continued.					
51	Charles Shelse *a*	$1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	$814 13 448 85 1,262 98	District of Columbia.
52	Morris Cohen *a*	1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 85 1,262 98	New York.
53	John E. Bristol *a*	1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 85 1,262 98	Do.
54	Halvor Nelson *a*	1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 85 1,262 98	Michigan.
55	Benjamin D. Thomson *a*	1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 85 1,262 98	New Jersey.
56	Alfred H. Elliott *a*	1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 85 1,262 98	Pennsylvania.
57	William A. Craig *a*	1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 85 1,262 98	New York.
58	James Loan *a*	1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 85 1,262 98	Pennsylvania.
59	William Gadsby *a*	1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 85 1,262 98	District of Columbia.
60	Charles Brandt *a*	1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 85 1,262 98	Maryland.
61	James H. Dodge *a*	1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 85 1,262 98	Do.
62	Arthur M. Muzzey *a*	1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 85 1,262 98	District of Columbia.
63	William D. Mack *a*	1,400	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 448 85 1,262 98	Michigan.
64	Hubbard T. Smith *a*	1,400	Apr. 20, 1882 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	439 11 448 85 887 96	Indiana.
	Class 1.					
65	Richard O'Dowd	1,200	Dec. 1, 1881	Nov. 30, 1882	1,200 00	Virginia.
66	Christian Anderson	1,200	... do	....do	1,200 00	New Jersey.
67	Burton R. Ross	1,200	....do	....do	1,200 00	District of Columbia.
68	Henry Morris	1,200	....do	... do	1,200 00	Delaware.

a Promoted from Class 1.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Class 1—Continued.					
69	John L. Robertson	$1,200	Dec. 1, 1881	Nov. 30, 1882	$1,200 00	New Jersey.
70	William C. Downes	1,200	do	do	1,200 00	Pennsylvania.
71	Charles C. Meade	1,200	do	do	1,200 00	Maryland.
72	George Q. Allen	1,200	do	do	1,200 00	Pennsylvania.
73	Benjamin F. Miller	1,200	do	do	1,200 00	New York.
74	Alfred Hartenstein	1,200	do	do	1,200 00	District of Columbia.
75	Henry C. Thomas	1,200	do	do	1,200 00	Maryland.
76	Clifton Lowe	1,200	do	do	1,200 00	Iowa.
77	William W. Davis	1,200	do	do	1,200 00	Delaware.
78	Thomas Wilson	1,200	do	do	1,200 00	District of Columbia.
79	Hugh Masterson	1,200	do	do	1,200 00	Maryland.
80	William P. Smith	1,200	do	do	1,200 00	District of Columbia.
81	Thomas Broderick	1,200	do	do	1,200 00	Do.
82	William Griffin	1,200	do	do	1,200 00	New York.
83	Daniel E. Knapp	1,200	do	do	1,200 00	Do.
84	Albert M. Evans	1,200	do	do	1,200 00	Pennsylvania.
85	Frank Eichelberger	1,200	do	do	1,200 00	Kansas.
86	John E. Gorman	1,200	do	do	1,200 00	New Jersey.
87	Theodore F. Hammond	1,200	do	do	1,200 00	New York.
88	William M. Sefton	1,200	do	do	1,200 00	District of Columbia.
89	Edwin H. Pearson	1,200	do	do	1,200 00	West Virginia.
90	James Toomey	1,200	do	do	1,200 00	Pennsylvania.
91	George B. French	1,200	do	do	1,200 00	Massachusetts.
92	Lawrence Morisey	1,200	do	do	1,200 00	District of Columbia.
93	George A. Young	1,200	do	do	1,200 00	Do.
94	James A. Stewart	1,200	do	do	1,200 00	Pennsylvania.
95	Michael Kelly	1,200	do	do	1,200 00	District of Columbia.
96	Charles E. Persons	1,200	do	do	1,200 00	Vermont.
97	Jacob Gotthief	1,200	do	do	1,200 00	District of Columbia.
98	Martin M. Mauger	1,200	do	do	1,200 00	Pennsylvania.
99	Isaac B. Ruff	1,200	do	do	1,200 00	Michigan.
100	William Mulhall	1,200	do	do	1,200 00	District of Columbia.
101	George F. Wetzerich	1,200	do	do	1,200 00	Do.
102	Squire G. Merrill	1,200	do	do	1,200 00	Connecticut.
103	John L. Norris	1,200	do	do	1,200 00	Maryland.
104	Rudolph Ullmer	1,200	do	do	1,200 00	District of Columbia.
105	Godfrey H. Leonard	1,200	do	do	1,200 00	Do.
106	James Dodge	1,200	do	do	1,200 00	Maryland.
107	Orlando E. Carnana	1,200	do	do	1,200 00	New York.
108	Edmund J. Brookings	1,200	do	do	1,200 00	Maine.
109	Willoughby North	1,200	do	do	1,200 00	New York.
110	Thomas C. Bourne	1,200	do	do	1,200 00	Do.
111	Charles Erwin	1,200	do	do	1,200 00	Do.
112	Charles DeForest	1,200	do	do	1,200 00	Do.
113	William W. Parker	1,200	do	do	1,200 00	Maryland.
114	Ricardo D. DeL. French	1,200	do	do	1,200 00	New York.
115	George H. Byron	1,200	do	do	1,200 00	Do.
116	Arthur Wiecker	1,200	do	do	1,200 00	District of Columbia.
117	Thomas G. Ash	1,200	do	do	1,200 00	Do.
118	August Henning	1,200	do	do	1,200 00	Virginia.
119	Ernest A. Fenton	1,200	do	do	1,200 00	New York.
120	Clarke C. Ellis	1,200	do	do	1,200 00	Do.
121	J. William Wallace	1,200	do	do	1,200 00	Massachusetts.
122	Edward W. Davis	1,200	do	do	1,200 00	District of Columbia.
123	George H. Knapp	1,200	do	do	1,200 00	New York.
124	Charles L. Patten	1,200	do	do	1,200 00	Maine.
125	Alfred Cock	1,200	do	do	1,200 00	Virginia.
126	Albert F. Bayard	1,200	do	do	1,200 00	New York.
127	William Haines	1,200	do	do	1,200 00	New Hampshire.
128	Frederick W. Collins	1,200	do	do	1,200 00	District of Columbia.
129	Arthur P. Whitney	1,200	do	do	1,200 00	New York.
130	Sanford Bradbury	1,200	do	do	1,200 00	Virginia.
131	Jere. C. Lyons	1,200	do	do	1,200 00	Ohio.
132	John B. Warder	1,200	do	do	1,200 00	District of Columbia.
133	Henry A. Johnson	1,200	do	do	1,200 00	Pennsylvania.
134	Charles Draeger	1,200	do	do	1,200 00	Do.
135	John E. Fullonton	1,200	do	do	1,200 00	Maine.
136	Theodore Horn	1,200	do	do	1,200 00	Virginia.
137	William H. Most	1,200	do	do	1,200 00	Maryland.
138	Smith Thompson	1,200	do	do	1,200 00	Do.
139	Frank Clifford	1,200	do	do	1,200 00	District of Columbia.
140	George O. Brown	1,200	do	do	1,200 00	Massachusetts.
141	Hamilton H. Hazard	1,200	do	do	1,200 00	District of Columbia.
142	James Moran	1,200	do	do	1,200 00	New York.
143	Henry S. Hetherington	1,200	do	do	1,200 00	Pennsylvania.
144	Norval W. King	1,200	do	do	1,200 00	District of Columbia.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Class 1—Continued.					
145	Edward P. Goodrich	$1,200	Dec. 1, 1881	Nov. 30, 1882	$1,200 00	District of Columbia
146	Cornelius Emmerich	1,200	do	do	1,200 00	Do.
147	Charles A. Stockett	1,200	do	do	1,200 00	Do.
148	James B. Hallwood	1,200	do	do	1,200 00	New York.
149	Louis R. Thian	1,200	do	do	1,200 00	Do.
150	Gustave Walden	1,200	do	do	1,200 00	Maryland.
151	William Heyn	1,200	do	do	1,200 00	District of Columbia
152	Joseph Smoliuski	1,200	do	do	1,200 00	Do.
153	William H. B. Kittson	1,200	do	do	1,200 00	New York.
154	Samuel B. Evans	1,200	do	do	1,200 00	District of Columbia
155	John S. Bosworth	1,200	do	do	1,200 00	Iowa
156	David Chase	1,200	do	do	1,200 00	District of Columbia
157	John L. McGee	1,200	do	do	1,200 00	West Virginia.
158	Eben D. Safford	1,200	do	do	1,200 00	New York.
159	William B. Stokes	1,200	do	do	1,200 00	Indiana.
160	Robert Bradin	1,200	do	do	1,200 00	New York.
161	Fred. Webber	1,200	do	do	1,200 00	Kentucky.
162	Rinaldo G. Daniels	1,200	do	do	1,200 00	Minnesota.
163	Nathaniel M. Macrae	1,200	do	do	1,200 00	District of Columbia
164	Samuel Jones	1,200	do	do	1,200 00	Virginia.
165	Monina G. Porter	1,200	do	do	1,200 00	District of Columbia
166	William H. Daniels	1,200	do	do	1,200 00	Pennsylvania.
167	James F. Maguire	1,200	do	do	1,200 00	District of Columbia
168	Edgar A. Barnard	1,200	do	do	1,200 00	Michigan.
169	Charles M. Nye	1,200	do	do	1,200 00	Nevada.
170	William M. Ash	1,200	do	do	1,200 00	Pennsylvania.
171	William F. Thompson	1,200	do	do	1,200 00	Alabama.
172	Valentine H. Cuming	1,200	do	do	1,200 00	District of Columbia
173	Francis S. Davidson	1,200	do	do	1,200 00	Massachusetts.
174	Clinton C. Palmer	1,200	do	do	1,200 00	Kansas.
175	Henry Farrell	1,200	do	do	1,200 00	District of Columbia
176	Charles E. Brunthaver	1,200	do	do	1,200 00	Ohio
177	Alonzo T. Logan	1,200	do	do	1,200 00	Texas.
178	William M. Fitzgerald	1,200	do	do	1,200 00	Tennessee
179	William A. Martin	1,200	do	do	1,200 00	Illinois
180	Hunter Brooke	1,200	do	do	1,200 00	Ohio.
181	John Hastings	1,200	do	do	1,200 00	New York
182	Norman H. Camp	1,200	Jan. 25, 1882	do	1,020 00	Massachusetts
183	Thomas F. Gibbs	1,200	Feb. 16, 1882	do	946 66	District of Columbia
184	Samuel C. Thompson	1,200	Mar. 1, 1882	do	903 33	Pennsylvania.
185	Thomas G. Carmick	1,200	Apr. 13, 1882	do	759 34	Do.
186	Samuel T. Brooks	1,200	July 16, 1882	do	451 09	Ohio.
187	John C. Stewart	1,200	Aug. 12, 1882	do	363 04	District of Columbia
188	James Brown	1,200	do	do	363 04	Do.
189	Thomas Maloney	1,200	do	do	363 04	Do.
190	Edward C. Carroll	1,200	do	do	363 04	Maryland.
191	Francis Scovyn	1,200	do	do	363 04	New York.
192	Winfield S. Maggill	1,200	do	do	363 04	Maryland.
193	Harry R. Hughes	1,200	do	do	363 04	Pennsylvania.
194	Wilmer W. Wetzel	1,200	do	do	363 04	District of Columbia
195	Daniel D. Davidson	1,200	do	do	363 04	Do.
196	Hanson F. Barnard	1,200	do	do	363 04	Do.
197	George W. Riggles	1,200	do	do	363 04	Do.
198	Joseph H. C. Hollins	1,200	do	do	363 04	Do.
199	Thomas H. Walsh	1,200	do	do	363 04	New York.
200	William S. Clarke	1,200	do	do	363 04	District of Columbia
201	William Hebrew	1,200	do	do	363 04	Pennsylvania.
202	Michael Burke	1,200	do	do	363 04	District of Columbia
203	James H. Hilton	1,200	do	do	363 04	Do.
204	Louis J. Garesché	1,200	do	do	363 04	Missouri.
205	Edwin K. Lundy	1,200	do	do	363 04	Pennsylvania.
206	Leonard C. Chew	1,200	do	do	363 04	District of Columbia.
207	Aaron A. Frear	1,200	do	do	363 04	Wisconsin.
208	Richard C. Jones	1,200	do	do	363 04	District of Columbia.
209	John M. E. McKee	1,200	do	do	363 04	Do.
210	Herbert E. Woodward	1,200	do	do	363 04	New York.
211	David S. Waters	1,200	do	do	363 04	District of Columbia.
212	Stanton Weaver	1,200	do	do	363 04	Ohio.
213	John T. Fallon	1,200	do	do	363 04	Maryland.
214	Gustavus A. Whitcomb	1,200	do	do	363 04	Minnesota.
215	Rudolph Johnson	1,200	do	do	363 04	District of Columbia.
216	John McCarthy	1,200	do	do	363 04	Do.
217	Herman H. Gerdes	1,200	do	do	363 04	Do.
218	Jacob W. Starr	1,200	do	do	363 04	New Jersey.
219	Richard Ricketts	1,200	do	do	363 01	District of Columbia
	Harry E. Covenhaver	1,200	do	do	363 04	Virginia.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Class 1—Continued.					
221	James Sabine	$1,200	Aug. 12, 1882	Nov. 30, 1882	$363 04	Massachusetts.
222	John H. Seiffert	1,200	do	do	363 04	District of Columbia.
223	Augustus W. Ballard	1,200	do	do	363 04	Illinois.
224	Louis M. Fitch	1,200	do	do	363 04	Colorado.
225	Alonzo F. Getty	1,200	do	do	363 04	District of Columbia.
226	David Cranmer	1,200	do	do	363 04	New York.
227	Robert H. Mitchell	1,200	do	do	363 04	District of Columbia.
228	Benjamin W. Summy	1,200	do	do	363 04	New York.
229	Robert J. Walker	1,200	do	do	363 04	Massachusetts.
230	Thomas McKernan	1,200	do	do	363 04	District of Columbia.
231	William R. Smith, sr	1,200	do	do	363 04	New York.
232	Ashton Todd	1,200	do	do	363 04	Maryland.
233	Martin L. Littlefield	1,200	do	do	363 04	Pennsylvania.
234	Avery A. Harwood	1,200	do	do	363 04	Minnesota.
235	George H. Chadwick	1,200	do	do	363 04	Alabama.
236	Reuben T. Sweet	1,200	Aug. 14, 1882	do	356 52	Illinois.
237	Samuel F. Brooks	1,200	Aug. 19, 1882	do	340 22	Virginia.
238	Samuel Hilton	1,200	Aug. 25, 1882	do	320 65	Rhode Island.
239	Thomas Bevans	1,200	Aug. 29, 1882	do	307 61	Missouri.
240	Daniel D. Brennan	1,200	Sept. 6, 1882	do	281 52	New York.
241	Charles Vertongen	1,200	Sept. 20, 1882	do	245 87	Ohio.
242	Anthony F. Morgan	1,200	Sept. 21, 1882	do	232 61	Illinois.
243	John W. Fenton	1,200	do	do	232 61	New York.
244	James I. Barrick	1,200	Sept. 22, 1882	do	229 35	West Virginia.
245	Frank D. Hill	1,200	Oct. 10, 1882	do	170 65	Minnesota.
	Class at $1,000.					
246	Andrew C. Rounea	.....	Dec. 1, 1881	Aug. 10, 1882	833 70	District of Columbia.
		1,000	Aug. 11, 1882	Nov. 30, 1882	304 59	
					1,138 29	
247	Timothy Coughlina	.....	Dec. 1, 1881	Aug. 10, 1882	833 70	New York.
		1,000	Aug. 11, 1882	Nov. 30, 1882	304 59	
					1,138 29	
248	Benjamin R. Shekell	1,000	Dec. 1, 1881	Nov. 30, 1882	1,000 00	District of Columbia.
249	Thomas J. Abbott	1,000	June 7, 1882	Nov. 30, 1882	481 93	Do.
250	Charles Forbesb	.....	Dec. 1, 1881	Aug. 4, 1882	488 48	New York.
		1,000	Aug. 5, 1882	Nov. 30, 1882	320 89	
					809 37	
251	Joseph O. Brawnerb	.....	Dec. 1, 1881	Aug. 4, 1882	488 48	Do.
		1,000	Aug. 5, 1882	Nov. 30, 1882	320 89	
					809 37	
252	Martin Hoyberger	1,000	Aug. 12, 1882	do	301 87	Virginia.
253	Adolph Meyer	1,000	do	do	301 87	District of Columbia.
254	Robert R. Selden	1,000	do	do	301 87	Do.
255	De Witt C. Burke	1,000	do	do	301 87	Michigan.
256	August Steffin	1,000	do	do	501 87	District of Columbia.
257	George T. Smallwood	1,000	do	do	301 87	Massachusetts.
258	Addison T. Drake	1,000	do	do	301 87	Michigan.
259	Florence McCarthy	1,000	do	do	301 87	District of Columbia.
260	Benjamin T. Franklin	1,000	Sept. 4, 1882	do	239 37	Kentucky.
	Assistant Messengers.					
261	James Richardson	720	Dec. 1, 1881	do	720 00	District of Columbia.
262	Michael Bowles	720	do	do	720 00	Pennsylvania.
263	Frank Schillinger	720	do	do	720 00	District of Columbia.
264	Lindsey Winslow	720	do	do	720 00	Virginia.
265	T. Humphrey Brooke	720	do	do	720 00	Do.
266	William T. Golden	720	do	do	720 00	Tennessee.
267	Henry Page	720	Aug. 5, 1882	do	231 52	Illinois.
268	Thomas W. Piper	720	Aug. 18, 1882	do	206 09	Ohio.
269	Francis Scott	720	Nov. 28, 1882	do	6 52	Wisconsin.
	Additional Clerks—Class 4.					
270	John C. Hesse c	1,800	Dec. 1, 1881	Nov. 30, 1882	1,800 00	District of Columbia.
271	Alva L. Morris c	1,800	do	do	1,800 00	Pennsylvania.

a Reduced from Class 1. *b* Promoted from assistant messenger.
c Transferred from regular roll, same grade, August 5, 1882.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Additional Clerks—Class 4—Continued.					
272	William J. Armstrong *a*	$1,800	Dec. 1, 1881	Nov. 30, 1882	$1,800 00	Pennsylvania.
273	Elon A. Woodward *a*	1,800	do	do	1,800 00	New York.
274	Henry Douglas *a*	1,800	do	do	1,800 00	District of Columbia.
275	David E. Holmes *a*	1,800	do	do	1,800 00	West Virginia.
276	Joseph S. McCoy *b*	1,800	do Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	1,086 17 578 80 1,664 97	New York.
277	Richard J. Blakelock *b*	1,800	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	1,086 17 578 80 1,664 97	District of Columbia.
278	George W. Salter *b*	1,800	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	1,086 17 578 80 1,664 97	New York.
279	Henry Ellerbrook *b*	1,800	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	1,086 17 578 80 1,664 97	District of Columbia.
280	Eugene Gaither *b*	1,800	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	1,086 17 578 80 1,664 97	Do.
281	George W. Pratt *b*	1,800	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	1,086 17 578 80 1,664 97	Maine.
282	Frederick H. Stafford *b*	1,800	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	1,086 17 578 80 1,664 97	New York.
	Class 3.					
283	William Anderson *c*	1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	951 15 513 83 1,464 98	Do.
284	John M. Harmon *c*	1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	951 15 513 83 1,464 98	Massachusetts.
285	Henry E. Scott *c*	1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	951 15 513 83 1,464 98	District of Columbia.
286	James B. Townsend *d*	1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 513 83 1,327 96	Massachusetts.
287	James W. Webb *d*	1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 513 83 1,327 96	New York.
288	Stephen Bates *d*	1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 513 83 1,327 96	Massachusetts.
289	Charles P. Miller, jr. *d*	1,600	Dec. 1, 1881 Aug. 5, 1882	Aug. 4, 1882 Nov. 30, 1882	814 13 513 83 1,327 96	Pennsylvania.

a Transferred from regular roll, same grade, August 5, 1882. *b* Promoted from regular roll, Class 4.
c Promoted from regular roll, Class 2. *d* Promoted from regular roll, Class 1.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Class 3—Continued.					
290	Thomas Y. Yates *a*	.....	Dec. 1, 1881	Aug. 4, 1882	$814 13	District of Columbia.
		$1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,327 96	
	Class 2.					
291	George W. Babcock *a*	....	Dec. 1, 1881	Aug. 4, 1882	814 13	Virginia.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
292	Francis Dalton *a*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	New York.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
293	William B. Douglas *a*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	Connecticut.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
294	Charles E. Connor *a*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	New York.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
295	Edwin H. Spang *a*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	Pennsylvania.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
296	Edward H. Atkins *a*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	Connecticut.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
297	Henry C. Porter *a*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	New York.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
298	John J. Meding *a*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	Do.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
299	William Schreiber *a*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	Maryland.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
300	Charles Camper *a*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	Do.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
301	Edward Turkenton *a*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	District of Columbia.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
302	Francis G. Littlefield *a*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	Massachusetts.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
	Class 1.					
303	William B. Mathews *b*	.....	Dec. 1, 1881	Aug. 4, 1882	679 11	Virginia.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	

a Promoted from regular roll, Class 1.
b Promoted from regular roll, Class at $1,000.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed
	Class 1—Continued.					
304	David C. Arnold	$1,200	Aug. 10, 1882	Nov. 30, 1882	$369 57	Indiana.
305	Ephraim M. Yount	1,200	Aug. 12, 1882	do	363 04	Iowa.
306	Charles H. Bliss	1,200	Aug. 12, 1882	do	363 04	Illinois.
307	Christian A. Fleetwood	1,200	Aug. 14, 1882	do	356 52	Maryland.
308	Ross Mathews	1,200	Aug. 16, 1882	do	350 00	Illinois.
309	Thomas H. Hedrick	1,200	Aug. 18, 1882	do	343 48	Iowa.
310	Lewis C. Herrick	1,200	Aug. 19, 1882	do	340 22	Illinois.
311	Edward N. Stewart	1,200	do	do	340 22	Pennsylvania.
312	Edgar Robinson	1,200	do	do	340 22	New York.
313	Alexander Abraham	1,200	Aug. 21, 1882	do	333 70	Alabama.
314	Joseph F. Rapp	1,200	do	do	333 70	West Virginia.
315	Wray Beattie	1,200	Aug. 22, 1882	do	330 44	Iowa.
316	Archibald B. MacSween	1,200	do	do	330 44	Michigan.
317	John F. Henry	1,200	do	do	330 44	New York.
318	Joseph A. Clarke	1,200	do	do	330 44	Louisiana.
319	George M. Rowe	1,200	Aug. 23, 1882	do	327 17	Colorado.
320	Carl A. Epping	1,200	do	do	327 17	Florida.
321	N. Byron Milliken	1,200	do	do	327 17	Maine.
322	William H. Mellach	1,200	do	do	327 17	New Jersey.
323	Frank Plunkett	1,200	do	do	327 17	Massachusetts.
324	Roger W. Winchell	1,200	do	do	327 17	Kansas.
325	William A. L. Gresham	1,200	Aug. 24, 1882	do	323 91	Indiana.
326	Julius Stommel	1,200	do	do	323 91	New Jersey.
327	James Daly	1,200	do	do	323 91	Texas.
328	Peter G. Clarke	1,200	Aug. 25, 1882	do	320 65	Alabama.
329	Thomas Evers	1,200	do	do	320 65	New York.
330	Abert Thomson	1,200	do	do	320 65	Florida.
331	Eric Johnson	1,200	Aug. 26, 1882	do	317 39	Illinois.
332	Chauncey L. Canfield	1,200	do	do	317 39	Nevada.
333	Thomas M. Pancoast	1,200	Aug. 28, 1882	do	310 87	Ohio.
334	George C. Finney	1,200	do	do	310 87	Minnesota.
335	James E. Johnson	1,200	do	do	310 87	Illinois.
336	Arthur D. McKnight	1,200	do	do	310 87	Ohio.
337	Benjamin C. Gallup	1,200	Aug. 29, 1882	do	307 61	Oregon.
338	William M. Potter	1,200	Sept. 4, 1882	do	288 04	Pennsylvania.
339	Wilbur F. Melbourne	1,200	Sept. 5, 1882	do	284 78	Missouri.
340	Oscar W. White	1,200	do	do	284 78	Pennsylvania.
341	Charles E. Troutman	1,200	do	do	284 78	Do.
342	Frederick A. Fowler	1,200	do	do	284 78	New York.
343	Paul B. Merritt	1,200	do	do	284 78	Massachusetts.
344	William H. Donohoe	1,200	Sept. 6, 1882	do	281 52	Ohio.
345	Constantine Perez, jr	1,200	do	do	281 52	Alabama.
346	John C. Burnet	1,200	do	do	281 52	Ohio.
347	Edward P. Masi	1,200	do	do	281 52	Wyoming Territory
348	J. Melvin Lamb	1,200	Sept. 7, 1882	do	278 26	Pennsylvania.
349	George M. Russell	1,200	do	do	278 26	Do.
350	William H. Leister	1,200	do	do	278 26	Ohio.
351	John Shea	1,200	do	do	278 26	District of Columbia.
352	William L. Barrington	1,200	Sept. 8, 1882	do	275 00	Illinois.
353	Edward Duff	1,200	Sept. 9, 1882	do	271 74	Pennsylvania.
354	John B. Dowd	1,200	Sept. 11, 1882	do	265 22	Indiana.
355	Edmund Weston	1,200	do	do	265 22	Vermont.
356	James M. Wright, jr	1,200	Sept. 12, 1882	do	261 96	District of Columbia.
357	James G. Eastwood	1,200	Sept. 14, 1882	do	255 43	Illinois.
358	Alexander H. McRae	1,200	do	do	255 43	Georgia.
359	Henry A. Smith	1,200	Sept. 15, 1882	do	252 17	Massachusetts.
360	Michael T. Dooley	1,200	do	do	252 17	South Carolina.
361	Daniel W. Hughes	1,200	do	do	252 17	Pennsylvania.
362	George H. Tichenor	1,200	Sept. 16, 1882	do	248 91	California.
363	Jesse K. McKeever	1,200	Sept. 18, 1882	do	242 39	Pennsylvania.
364	George W. Roby	1,200	Sept. 19, 1882	do	239 13	Maryland.
365	Philip R. R. M. Sattes	1,200	Sept. 20, 1882	do	235 87	Ohio.
366	Samuel Snow	1,200	Sept. 22, 1882	do	229 35	Connecticut.
367	Dudley W. Farlin	1,200	do	do	229 35	New York.
368	William H. Church	1,200	Sept. 23, 1882	do	226 09	Iowa.
369	Alex. S. Whiteside	1,200	do	do	226 09	Maryland.
370	William S. Burton	1,200	do	do	226 09	Iowa.
371	George W. McMorris	1,200	Sept. 25, 1882	do	219 57	Pennsylvania.
372	Orville Drown	1,200	Sept. 26, 1882	do	216 30	Vermont.
373	John W. Drew	1,200	Sept. 27, 1882	do	213 04	New Jersey.
374	William Baird	1,200	Sept. 29, 1882	do	206 52	West Virginia.
375	George M. Smith	1,200	do	do	206 52	Do.
376	Richard F. Barter	1,200	Sept. 30, 1882	do	203 26	Indiana.
377	John A. Evans	1,200	Oct. 2, 1882	do	196 73	Wisconsin
378	Nathan F. White	1,200	do	do	196 73	Connecticut.
379	George E. Doughty	1,200	Oct. 6, 1882	do	183 69	Indiana.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	To—	Amount received.	Residence when appointed.
	Class 1—Continued.					
380	George E. M. Liston	$1,200	Oct. 6, 1882	Nov. 30, 1882	$183 69	Indiana.
381	Edward P. Leech	1,200	do	do	183 69	New York.
382	Fred. G. Moffatt	1,200	Oct. 7, 1882	do	180 43	Do.
383	Andrew J. Baird	1,200	do	do	180 43	Georgia.
384	Edmund S. Durment	1,200	Oct. 9, 1882	do	173 91	Indiana.
385	Joseph Sands	1,200	do	do	173 91	Tennessee.
386	Adelbert M. Bliss	1,200	Oct. 10, 1882	do	170 65	Michigan.
387	George B. Shinrall	1,200	Oct. 11, 1882	do	167 39	Mississippi.
388	Eugene M. Merrick	1,200	do	do	167 39	New York.
389	Emory J. Bentley	1,200	do	do	167 39	Wisconsin.
390	Heman M. Cady	1,200	Oct. 14, 1882	do	157 61	Do.
391	Edward B. Eynon	1,200	Oct. 17, 1882	do	147 82	Pennsylvania.
392	Francis W. R. Braddock	1,200	Oct. 20, 1882	do	138 04	Ohio.
393	Charles L. Grannis, jr.	1,200	Oct. 24, 1882	do	125 00	Minnesota.
394	John T. Kean	1,200	Oct. 27, 1882	do	115 21	Iowa.
395	Augustus Funk	1,200	Oct. 31, 1882	do	102 17	New York.
396	William B. Marr	1,200	Nov. 4, 1882	do	89 13	Illinois.
397	George J. P. Wood	1,200	Nov. 8, 1882	do	76 09	Indiana.
398	George E. Ross	1,200	Nov. 10, 1882	do	69 57	Ohio.
399	William T. Hughes	1,200	do	do	69 57	Do.
400	William T. Leport	1,200	Nov. 11, 1882	do	66 31	New Jersey.
401	John T. Erwin	1,200	Nov. 13, 1882	do	59 79	Illinois.
402	James G. Naylor, jr.	1,200	Nov. 14, 1882	do	56 52	District of Columbia.
403	Adolph H. Fiegenbaum	1,200	Nov. 20, 1882	do	36 96	Iowa.
404	Harman C. Westervelt	1,200	Nov. 21, 1882	do	33 70	New York.
405	John G. Reeves *a*	.....	Sept. 25, 1882	Nov. 22, 1882	115 43	Illinois.
		1,200	Nov. 23, 1882	Nov. 30, 1882	27 18	
					142 61	
406	William T. Asson	1,200	do	do	27 18	Pennsylvania.
407	Joseph S. Baner	1,200	Nov. 23, 1882	do	27 18	Illinois.
408	William T. Spencer	1,200	Nov. 24, 1882	do	23 92	Connecticut.
	Assistant Messengers.					
409	Myron H. Beaumont	720	Aug. 17, 1882	Nov. 30, 1882	208 04	District of Columbia.
410	Patrick Wall	720	Aug. 24, 1882	do	194 34	Do.
411	James O. Bamfield	720	Aug. 26, 1882	do	190 43	South Carolina.
412	Adolph Liebschutz	720	Sept. 2, 1882	do	176 74	Missouri.
413	George W. Parris	720	Sept. 8, 1882	do	165 00	Ohio.
414	George W. Leonard	720	Sept. 14, 1882	do	153 26	Indiana.
415	Louis J. Melchoir	720	Oct. 2, 1882	do	118 05	Maryland.
	Watchmen.					
416	Harmon T. Lord	720	Aug. 18, 1882	Nov. 30, 1882	206 09	New Jersey.
417	Daniel Carson	720	Aug. 19, 1882	do	204 13	Maryland.
418	William B. Denny *b*	720	Sept. 1, 1882	do	120 00	New York.
419	James F. Cullen	720	Sept. 2, 1882	do	176 74	Tennessee.
420	James McGrath	720	Sept. 12, 1882	do	157 17	Ohio.
421	Voltaire Randall	720	Sept. 25, 1882	do	131 74	Maryland.
422	John Walters	720	Oct. 3, 1882	do	116 09	District of Columbia.
	Laborers.					
423	Nelson T. Burch	660	Sept. 11, 1882	Nov. 30, 1882	145 87	Virginia.
424	Manuel Jones	660	Sept. 12, 1882	do	144 08	Do.
425	James H. Smith	660	Sept. 26, 1882	do	118 97	Do.
	CLERKS, &C., IN LIEU OF "GENERAL SERVICE."					
	Class 3.					
426	William N. Peck *c*	.....	Dec. 1, 1881	Aug. 4, 1882	951 15	New York.
		1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,464 98	

a Promoted from assistant messenger.
b On leave of absence without pay until October 1, 1882.
c Promoted from regular roll, Class 2.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Class 3—Continued.					
427	George W. Nagle *a*	.....	Dec. 1, 1881	Aug. 4, 1882	$951 15	Maryland.
		$1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,464 98	
428	Jeremiah C. Allen *a*	.....	Dec. 1, 1881	Aug. 4, 1882	951 15	Wisconsin.
		1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,464 98	
429	William M. Porter *a*	.....	Dec. 1, 1881	Aug. 4, 1882	951 15	Massachusetts.
		1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,464 98	
430	Jesse W. Lee, jr *b*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	Maryland.
		1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,327 96	
431	Thomas R. Senior *b*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	Pennsylvania.
		1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,327 96	
432	William Bremer *b*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	Indiana.
		1,600	Aug. 5, 1882	Nov. 30, 1882	513 83	
					1,327 96	
433	Nathaniel Hershler	1,600	Aug. 17, 1882	....do	461 65	Illinois.
434	Elias S. Terry	1,600	Aug. 29, 1882	....do	409 48	Do.
435	John T. Masters	1,600	Sept. 6, 1882	....do	374 70	New York.
	Class 2.					
436	Benjamin F. Evans *b*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	District of Columbia
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
437	William F. Richardson *b*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	Do.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
438	Henry A. Gross *b*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	District of Columbia
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
439	Charles A. Krause *b*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	Texas.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
440	Myron Boardman *b*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	New York.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
441	Benj. B. Kercheval *b*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	Virginia.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
442	Lewis Williams *b*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	District of Columbia
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
443	Martin B. Lichty *b*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	Do.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	

a Promoted from regular roll, Class 2.
b Promoted from regular roll call, Class 1.

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Statement showing names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Class 2—Continued.					
444	George V. Balch *a*	.....	Dec. 1, 1881	Aug. 4, 1882	$814 13	District of Columbia.
		$1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
445	James L. Falbey *a*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	Pennsylvania.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
446	Rudolph Heinrichs *a*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	District of Columbia.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
447	William G. Powers *a*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	Massachusetts.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
448	St. George R. Raby *a*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	New York.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
449	William H. B. Ramsey *a*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	Pennsylvania.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
450	S. Dana Lincoln *a*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	Minnesota.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
451	Thomas E. Hatch *a*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	New Hampshire.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
452	James P. Hart *a*	.....	Dec. 1, 1881	Aug. 4, 1882	814 13	Pennsylvania.
		1,400	Aug. 5, 1882	Nov. 30, 1882	448 85	
					1,262 98	
453	Joseph Fought	1,400	Aug. 12, 1882	....do	422 22	Do.
454	James Fishback	1,400	....do	....do	422 22	Illinois.
455	George W. Upton	1,400	....do	....do	422 22	Oregon.
	Class 1.					
456	Charles Altman *b*	.....	Dec. 1, 1881	Aug. 4, 1882	679 11	Iowa.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	
457	Fred. M.P. Montague *b*	.....	Dec. 1, 1881	Aug. 4, 1882	679 11	Virginia.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	
458	William E. Newman *b*	.....	Dec. 1, 1881	Aug. 4, 1882	679 11	Vermont.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	
459	William W. Lecture *b*	.....	Dec. 1, 1881	Aug. 4, 1882	679 11	District of Columbia
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	
460	Harlow L. Street *b*	.....	Dec. 1, 1881	Aug. 4, 1882	679 11	California.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	

a Promoted from regular roll, Class 1.
b Promoted from regular roll, class at $1,000 per annum.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Class 1—Continued.					
461	Charles B. Steele *a*	.....	Dec. 1, 1881	Aug. 4, 1882	$679 11	Michigan.
		$1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	
462	Joseph A. O'Neill *a*	.....	Dec. 1, 1881	Aug. 4, 1882	679 11	Pennsylvania.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	
463	George B. Abrams *a*	.....	Dec. 1, 1881	Aug. 4, 1882	679 11	New York.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	
464	Frank W. Paige *a*	.....	Dec. 1, 1881	Aug. 4, 1882	679 11	District of Colum. a
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	
465	William T. Evans *a*	.....	Dec. 1, 1881	Aug. 4, 1882	679 11	Illinois.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	
466	Edward E. Womersley *a*	.....	Dec. 1, 1881	Aug. 4, 1882	679 11	Massachusetts.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	
467	Sanford B. Woodward *a*	.....	Dec. 1, 1881	Aug. 4, 1882	679 11	New Hampshire.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	
468	Amasa Copp *a*	.....	Dec. 1, 1881	Aug. 4, 1882	679 11	New York.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	
469	Granville C. West *a*	.....	Dec. 1, 1881	Aug. 4, 1882	679 11	Kansas.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	
470	Frederick A. Piper *a*	.....	Dec. 1, 1881	Aug. 4, 1882	679 11	Maine.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	
471	Augustus H. Raymond *a*	.....	Dec. 1, 1881	Aug. 4, 1882	679 11	Virginia.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	
472	Charles Katzenstein *a*	.....	Dec. 1, 1881	Aug. 4, 1882	679 11	Michigan.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	
473	William Platt *a*	.....	Dec. 1, 1881	Aug. 4, 1882	679 11	Pennsylvania.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	
474	Arthur Foster *a*	.....	Dec. 1, 1881	Aug. 4, 1882	679 11	Maryland.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	
475	Alfred Cammack *a*	.....	Dec. 1, 1881	Aug. 4, 1882	679 11	District of Columbia.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	

a Promoted from regular roll, class at $1,000 per annum.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Class 1—Continued.					
476	Charles S. Hart *a*	.....	Dec. 1, 1881	Aug. 4, 1882	$679 11	New Jersey.
		$1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	
477	Thomas Campbell *a*	.....	Dec. 1, 1881	Aug. 4, 1882	679 11	South Carolina.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	
478	George W. Waite *a*	.....	Dec. 1, 1881	Aug. 4, 1882	679 11	Nevada.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,064 98	
479	Robert B. Lynch *a*	.....	Dec. 16, 1881	Aug. 4, 1882	638 59	Wisconsin.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					1,024 46	
480	Seaton Munroe *a*	.....	Jan. 16, 1882	Aug. 4, 1882	553 44	District of Columbia.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					939 31	
481	Jay H. McFall *a*	.....	Jan. 16, 1882	Aug. 4, 1882	553 44	Wisconsin.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					939 31	
482	Charles W. Geddes *a*	.....	Apr. 28, 1882	Aug. 4, 1882	270 63	South Carolina.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					656 50	
483	Gustavus B. Maynadier. *a*	.....	July 21, 1882	Aug. 4, 1882	40 76	District of Columbia.
		1,200	Aug. 5, 1882	Nov. 30, 1882	385 87	
					426 63	
484	Gilbert C. Kniffin	1,200	Aug. 12, 1882	....do	363 04	Kentucky.
485	Albert B. Ferguson	1,200	... do	....do	363 04	District of Columbia.
486	William R. Bailey	1,200	....do	... do	363 04	Do.
487	John H. Lindley	1,200	....do	....do	363 04	Illinois.
488	Arthur B. Mason	1,200	....do	....do	363 04	Do.
489	William H. French, jr	1,200	....do	....do	363 04	Virginia.
490	Frank A. Lancaster	1,200	....do	....do	363 04	Massachusetts.
491	David Currier	1,200	....do	....do	363 04	New Hampshire.
492	Henry B. Bayly	1,200	....do	....do	363 04	Illinois.
493	John S. Friel	1,200	....do	....do	363 04	Pennsylvania.
494	William E. Colladay	1,200	....do	....do	363 04	Wisconsin.
495	Melville H. Howard	1,200	....do	....do	363 04	Pennsylvania.
496	Bartholomew O'Leary	1,200	....do	....do	363 04	New York.
497	Martin O'Connor	1,200	....do	....do	363 04	District of Columbia.
498	Philip H. Weber	1,200	....do	....do	363 04	Do.
499	Henry Schultz	1,200	... do	....do	363 04	Do.
500	John Finn	1,200	....do	....do	363 04	Maryland.
501	William J. Allen	1,200	....do	....do	363 04	Pennsylvania.
502	Richard B. Travers	1,200	Aug. 17, 1882	....do	346 73	District of Columbia.
503	Christopher Edie	1,200	Oct. 9, 1882	....do	173 91	New York.
	Messengers.					
504	William A. Scott	840	Aug. 12, 1882	Nov. 30, 1882	254 13	District of Columbia.
505	Fred. O. Mack	840	... do	....do	254 13	Do.
506	James McGilton	840	....do	....do	254 13	Do.
507	Edward Quade	840	....do	....do	254 13	Do.
508	Richard W. Spain	840	....do	....do	254 13	Do.
	Assistant Messengers.					
509	Joseph H. Johnson	720	Aug. 12, 1882	Nov. 30, 1882	217 83	Virginia.
510	George H. Short	720	....do	....do	217 83	District of Columbia.
511	William Goldsbrough	720	....do	....do	217 83	Do.
512	Stephen Kane	720	....do	....do	217 83	Do.
513	Patrick Larkin	720	....do	....do	217 83	Do.

a Promoted from regular roll, class at $1,000 per annum.

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Statement showing the names, compensation, &c.—Continued.

No.	Name.	Annual salary.	Period of service. From—	Period of service. To—	Amount received.	Residence when appointed.
	Assistant Messengers—Continued.					
514	Samuel McMonigle	$720	Aug. 12, 1882	Nov. 30, 1882	$217 83	District of Columbia.
515	Jacob Madert	720	do	do	217 83	Do.
516	Frederick Landgraf	720	do	do	217 83	Do.
517	Thomas Sheridan	720	do	do	217 83	New Jersey.
518	Joseph Allen	720	do	do	217 83	District of Columbia.
519	John Malone	720	do	do	217 83	New Jersey.
520	James Noonan	720	do	do	217 83	District of Columbia
521	John Kelly	720	do	do	217 83	Do.
522	Matthew Murphy	720	do	do	217 83	Do.
523	August Grimm	720	do	do	217 83	Do.
524	John C. Kohler	720	do	do	217 83	California.
525	Joseph Clements	720	do	do	217 83	District of Columbia.
526	Thomas Wynne	720	do	do	217 83	Do.
527	John Weidman	720	do	do	217 83	Do.
528	John O'Hagan	720	do	do	217 83	Do.
529	Edwin D. Perkins	720	do	do	217 83	Do.
530	Adam Dade	720	do	do	217 83	Do.
531	John Widmire	720	do	do	217 83	Do.
532	Ira G. Scott	720	do	do	217 83	California.
533	Daniel Killigan	720	do	do	217 83	District of Columbia.
534	William Gill	720	do	do	217 83	Do.
535	Michael J. Hewston	720	do	do	217 83	Do.
536	John B. Nesbitt	720	do	do	217 83	Do.
537	Fred. C. Burhuss, jr.	720	do	do	217 83	Iowa.
538	Joseph J. Crotty	720	do	do	217 83	Ohio.
539	Jacob B. Baker	720	do	do	217 83	District of Columbia.
540	George R. Rowan	720	do	do	217 83	New York.
541	John Mitchell	720	Sept. 11, 1882	do	159 13	District of Columbia.
342	William H. Pike	720	Sept. 13, 1882	do	155 22	Massachusetts.
543	Septemius T. Graham (*a*)	.....	Sept. 14, 1882	Sept. 19, 1882	10 76	Kansas.
		720	Sept. 20, 1882	Nov. 30, 1882	141 52	
					152 28	
	Watchmen.					
544	John Anderson	720	Aug. 12, 1882	Nov. 30, 1882	217 83	Pennsylvania.
545	Joseph A. Jewett	720	do	do	217 83	Indiana.
546	Henry T. Moore	720	do	do	217 83	Pennsylvania.
547	Michael Cavanagh	720	do	do	217 83	New York.
548	Adam Fraber	720	do	do	217 83	District of Columbia.
549	Alphonso W. Bogia	720	do	do	217 83	Delaware.
550	William H. Goodacre	720	do	do	217 83	Maryland.
551	James Plant	720	do	do	217 83	New York.
552	Charles E. Murray	720	do	do	217 83	District of Columbia.
553	Samuel Wills	720	do	do	217 83	Do.
554	Morgan McInerny	720	do	do	217 83	Do.
555	Nicholas McGowan	720	do	do	217 83	Do.
556	Bartholomew Daly	720	do	do	217 83	New York.
557	Thomas W. Sims	720	do	do	217 83	District of Columbia.
558	Theodore Winn	720	do	do	217 83	Massachusetts.
559	William Waters	720	do	do	217 83	District of Columbia.
560	Reuben M. Whitney	720	do	do	217 83	Maryland.
561	Martin Kelly	720	do	do	217 83	District of Columbia.
562	Francis E. Northhous	720	Aug. 26, 1882	do	190 43	California.
563	John L. Ripple	720	Sept. 25, 1882	do	131 74	Pennsylvania.

a Promoted from laborer, additional roll.

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47TH CONGRESS, 2d Session. } SENATE. { Ex. Doc. No. 19.

LETTER

FROM

THE SECRETARY OF THE NAVY,

TRANSMITTING,

In response to Senate resolution of December 16, 1882, *information relating to the reports of inspections made by officers of the Navy, of the Revenue Marine, Life-Saving Service, and Marine-Hospital Service.*

DECEMBER 19, 1882.—Referred to the Committee on the Judiciary and ordered to be printed.

NAVY DEPARTMENT,
Washington, December 18, 1882.

SIR: I have the honor to acknowledge the receipt of the resolution adopted by the Senate on the 16th day of December, as follows:

Whereas the Secretary of the Navy has stated in his annual report that under orders from the Navy Department certain naval officers have prepared reports upon the Revenue-Marine Service, the Life-Saving Service of the Treasury Department, and that another naval officer has prepared a report upon the Marine-Hospital Service, also of the Treasury Department: Therefore, *Be it resolved*, That the Secretary of the Navy be requested to furnish for the information of the Senate a copy of the order or orders under which the reports were prepared, stating the authority of law under which such order or orders were issued, and also that he inform the Senate whether any of the vessels of the Revenue Service, the stations of the Life-Saving Service, or the marine hospitals were inspected by any naval officer, and whether in making such inspection and reports the naval officers gave any opportunity for the officers in charge of such vessels, stations, or hospitals to make any statement or remark, and whether the Treasury Department gave consent that the services under its control should be inspected and reported upon by naval officers.

In reply to the foregoing resolution, I have to state that no written orders were given by the Navy Department for the preparation of the information and suggestions concerning the Revenue Marine and the Life-Saving Service of the Treasury Department, and of the facts and statistics upon the subject of marine hospitals, also of the Treasury Department, which accompanied the annual report of the Navy Department of November 28, 1882; but such orders were given orally by the Secretary of the Navy.

The orders were not given in pursuance of any express authority of law, but in order to enable the head of the Navy Department to perform his duty of reporting to the President and the Congress his opinions concerning all matters connected with the Naval establishment and his recommendations for its improvement.

Among those opinions and recommendations were the following:

The necessity of any further reduction of the naval officers might be obviated by extending the sphere of their active employment. The situation and policy of the

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United States make it improbable that the country will soon or often be engaged in naval warfare. The opportunities for naval officers to practice the art of actual war are remote. Yet, the national safety depends upon maintaining, instructing, disciplining, and practicing at all times a reasonable naval force. To this end the officers and seamen of the Navy should perform all the work required for the purposes of the national government upon or in direct connection with the ocean. This clear and salutary principle should be deliberately adopted and effectually enforced in all proper methods by the national Congress; and if it should be thus fully recognized and applied in all practicable ways, it would vastly invigorate, improve, and strengthen the Navy, without increased expense to the government, but, on the contrary, with results of positive economy.

The application of the principle above stated to the Revenue Marine and Life-Saving Service will be apparent from those extracts from the report, which are respectfully appended to this communication, together with a further extract suggesting the union of the marine hospitals now directed by the Treasury Department with the naval hospitals now conducted by the Navy Department.

No vessel of the Revenue Service or station of the Life-Saving Service or marine hospital was inpected or visited by any of the officers who arranged the facts, statistics, and suggestions which were submitted with the report of this department, nor by any other person by the direction or with the knowledge of the Secretary; but the same were prepared from public documents and general sources of information. Possibly a slight exception to this statement may be required for the reason that in September last an officer of the Navy, under orders on other business to New York and Boston, was ordered to stop at New Bedford, and was orally directed to there visit the Revenue Marine school-ship, and did so visit it during the vacation, and conversed with the officers in charge, but made no written report. No consent from the Treasury Department for this casual visit to a public institution, open to every citizen, was deemed necessary or obtained; no discourtesy to the head of that department was conceived or committed, nor did the visit to any appreciable extent affect the facts or opinions submitted to the President and the Congress by the head of this department, those opinions having been entertained for many years, and having been first formed by reason of public service in the Treasury Department.

Very respectfully,

WM. E. CHANDLER,
Secretary of the Navy.

To the PRESIDENT OF THE SENATE.

Extract relative to the Revenue Marine and Life-Saving Service.

The Revenue-Cutter Service affords a proper field for the employment of naval officers. The duty is directly in the line of their profession. They are fitted for it, both by training and experience; and if they could be so employed without detriment to the interests of the existing corps of officers, a great and permanent benefit to the government and to the Navy would result.

The service of the cruising cutters is strictly naval. The duties of the officers are not distinguishable in kind from those of naval officers. The discipline is naval, as far as naval discipline can be carried on outside the Navy Department.

The cruising cutters carry an armament of from one to four guns. The crew are armed with small-arms. The broadside guns are furnished by the Navy Department. In time of war these vessels have always been pressed into the naval service.

At the date of the annual report of 1881, there were thirty-six vessels in the Revenue Marine. Deducting the eight vessels on harbor duty, and five sailing vessels, there remain twenty-three steamers, fifteen of which are propellers of from 131 to 403 tons; and eight are side-wheel steamers of from 201 to 499 tons. These twenty-

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three vessels, which may be classed as gunboats, are good vessels of their class, and must always be regarded as a part of the available naval force.

The experience acquired by junior naval officers, if employed in the cutter service in cruising on our coast, and in assisting vessels in distress, would be of direct benefit in their profession and to the country in case of war. They would acquire a familiarity with the coast, and a knowledge of local pilotage that could not otherwise be obtained. They would have practice in the handling of small vessels under difficult circumstances. Employed at first in the lowest rank, they would readily acquire whatever might be new or peculiar in this branch of the service.

In the interest, of economy the change suggested is desirable. While the Navy proper is being reduced, the government is keeping up a revenue navy of 34 captains, 86 lieutenants, and 65 engineers; in all, 185 officers. Two training-schools are maintained to do the work of one. The Naval Academy at Annapolis is supplied with a full corps of instructors and every appliance for the training at all times of 335 naval cadets. At the same time another school is maintained at New Bedford for the training of Revenue Marine cadets, covering the same ground, only in a limited degree and with imperfect appliances. The Revenue Marine cadets receive $900 a year during their service at the school. Recent legislation has provided that only a part of each graduating class at Annapolis shall enter the Navy, while the remainder shall be given a year's pay and remanded to private life. All these young men, upon whom the government has bestowed a gratuitous education, are well fitted for their profession, from which they are thus excluded; and by opening the cruising-cutter service to these graduates of the Naval Academy, the government will save, at a single stroke, the whole cost of a duplicate establishment.

In order to harmonize all the interests involved in connecting naval officers with the Revenue-Cutter Service, the administration of the two services should be combined under the Navy Department. The small vessels employed on harbor duty, which are only used to carry inspectors of customs, and as a sort of harbor police, should remain solely attached to the Treasury, as at present. The duty is not such as to require a special corps of officers. The cruising cutters should be transferred to the Navy Department, but they should be assigned to duty in the various districts, as at present, upon the requisition of the Secretary of the Treasury, and their movements may be directed for the time being by the collectors of customs. The present Revenue Marine officers should become a corps in the Navy, receiving life commissions as naval officers, with all the rights and privileges that belong to such commissions, while the vacancies gradually made at the foot of the list should be supplied by the detail of junior officers of the Navy of corresponding grade, for service on board the cutters. It is not proposed to remove the present officers of the Revenue Marine, or to take away or abridge, in the slightest degree, their privileges or emoluments. On the contrary, they would retain all that they now enjoy, and, without re-examination, or a new test of any kind, would receive in addition the benefits of a permanent naval commission. Vacancies in the upper grades should continue to be filled by promotion in the corps, and naval officers should only be detailed as vacancies are made at the bottom of the list. The duties of the Revenue Marine officers would remain the same as they now are; and it should be particularly provided, in any change that might be made, that their position should in no way be altered, except by giving all, including the engineers, the same permanency of tenure now enjoyed only by naval officers, and the same right of being placed upon the retired list of the Navy, in the case of extreme age or disability—changes in every respect advantageous.

If the transfer of the Revenue Marine to the Navy should be deemed desirable, the Life-Saving Service would probably follow. The two services are already so closely connected, and the tendency towards a further union is so strong, that they would necessarily be conducted together. By the act of 1878 it was provided that the officers of the Revenue Marine should be detailed for duty as inspectors and assistant inspectors of life-saving stations. A captain of the Revenue Marine is the superintendent of construction in the Life-Saving Service. The cruising cutters co-operate actively in the work, and are frequently employed in the assistance of vessels in distress.

If it is not the policy of the government to make appropriations for sufficient ships of war to give adequate occupation to all our naval officers, it should certainly make use of them in every branch of the public service for which they are fitted. A highly-trained corps of officers, such as modern naval warfare demands, cannot be created in a day. If the *personnel* of the Navy is to be kept at its present standard of quality and numbers, it must be utilized in every form of government employment for which it is adapted. In this view it hardly admits of question that the Revenue Marine and the Life Saving Service should be joined with the Navy. No disturbance of vested interests would be caused by the transfer; on the contrary, ever provision would be made to guard against such a disturbance. But a new field would be opened for the services of officers already at the disposal of the government, which by their training they are in every way qualified to occupy.

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Extract relative to marine and naval hospitals.

If it should be deemed advisable to establish the Bureau of Mercantile Marine in the Navy Department, the Marine and Naval Hospital Services would naturally be united. Obviously, the department with which the service is naturally associated is the Navy Department—a department which now has the physical care of 8,250 seamen; a department to which the service is akin, to which it is of the greatest importance to foster, by every means at its command, that very class whom the service is designed to relieve, and in which there is a bureau specially charged with the care and comfort of sea-faring men.

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47TH CONGRESS, 2d Session. } SENATE. { Ex. DOC. No. 20.

MESSAGE

FROM THE

PRESIDENT OF THE UNITED STATES,

TRANSMITTING

A communication from the Secretary of War, relating to abandoned military reservations, and renewing his former recommendation for legislation which will provide for the disposal of such reservations no longer needed.

DECEMBER 19, 1882.—Read and referred to the Committee on Appropriations and ordered to be printed.

To the Senate and House of Representatives:

I transmit herewith, for the consideration of Congress, a communication from the Secretary of War upon the subject of abandoned military reservations, and renewing his former recommendation for such legislation as will provide for the disposal of military sites that are no longer needed for military purposes.

CHESTER A. ARTHUR.

EXECUTIVE MANSION,
December 19, 1882.

WAR DEPARTMENT,
Washington City, December 18, 1882.

SIR: I have the honor to inclose herewith, with request for their transmission to Congress, a letter from the Adjutant-General of the Army, of the 15th instant, and its accompanying papers, upon the subject of abandoned military reservations.

The letter referred to, in conjunction with department letter of January 17, 1882, and its accompanying papers, published as House Ex. Doc. No. 39, Forty-seventh Congress, first session, copy herewith, gives a statement of the military reservations no longer needed for military purposes, and shows also their present status.

In view of the importance of this subject and of the benefits that will unquestionably accrue to the government from such legislation, I again recommend that Congress grant authority to dispose of the reservations reported as no longer needed for military purposes, and that a general law be passed authorizing the Secretary of War to transfer such military sites as may hereafter become useless for military purposes to the custody of the Secretary of the Interior for sale to the highest bidder, after appraisement, or for disposition under the general land laws or

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such other disposition as may be deemed to be for the best interests of the United States.

Very respectfully, your obedient servant,

ROBERT T. LINCOLN,
Secretary of War.

The PRESIDENT.

ADJUTANT-GENERAL'S OFFICE,
Washington, December 15, 1882.

SIR: I have the honor to invite your attention to the subject of abandoned military reservations, and to state that since my reports of December 8 and 15, 1881, in relation thereto, published in House Ex. Doc. No. 39, Forty-seventh Congress, first session, copy herewith, the disposition of but *three* more of the reservations included in the list of "reservations reported as no longer required for military purposes, &c.," has been authorized by Congress, viz, those of Fort Benton, Mont., Fort Larned, Kans. (acts approved August 4, 1882), and Oglethorpe Barracks, Ga. (act approved April 7, 1882).

In continuation of my former reports, the following additional information is published:

FORT FETTERMAN, WYO.

(Reduction of post reservation and relinquishment of *old* wood reserve and the hay reserve heretofore recommended.)

The post has since been abandoned; the principal buildings were sold September 29, 1882, under authority of the War Department, and military custody of same ceased November 1, 1882. Under the Secretary's instructions of May 1, 1882, the *entire* post reservation, together with the *new* wood reservation on La Bonté Creek, about 30 miles south of the post, declared by the President's order of February 9, 1877, and having an area of two square miles, are now reported for the action of Congress.

FORTS DODGE AND WALLACE, KANS.

Under date of July 20, 1882, the Secretary of War transmitted to Congress copies of correspondence relative to the disposal of the lands and buildings at these two posts, and requested, in view of the advantage that would thereby accrue to the government, that such legislation be had as would authorize him to subdivide the reservations and sell the buildings, with the grounds upon which they are located. (*Vide* House Ex. Doc. No. 225, Forty-seventh Congress, first session, copy herewith.) No final action appears to have been taken by Congress in the matter.

I have also the honor, pursuant to your instructions of June 16, 1882, to report the following additional cases of useless military reservations, with a view of their being brought to the attention of Congress during the present session.

OLD FORT LYON, COLO.

This reservation was declared by the President's order of August 8, 1863, as the site of "Fort Wise," established August 29, 1860, embracing an area of 60 square miles. The name was changed to Fort Lyon in

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1862, and in June, 1867, the post was abandoned and the troops removed to the present site, also known as Fort Lyon, about 20 miles distant, where a reserve was declared by the President's order of September 1, 1868.

In this connection attention is invited to the accompanying copy of letter from the Commissioner of the General Land Office, addressed to this department, under date of June 5, 1882, containing a history and description of the reservation of Old Fort Lyon, together with reasons for Congressional action. From this letter it appears that in 1873 and 1874 most of the lands embraced in the reservation were *subdivided as public lands*, and the limits of the reserve were not respected, through inadvertence. In order that the lands may be properly disposed of, the Commissioner now desires that the action of Congress be invoked.

FORT SANDERS, WYO.

Post established July 10, 1866, and called "Fort John Buford"; name changed to Fort Sanders September 5, 1866.

Located on the Laramie Plains, three miles from Laramie City, on the Union Pacific Railroad, which has a station at the post.

Reservation declared by the President January 7, 1867, with an area of 36 square miles, 6 miles square; *enlarged* by President's order of June 28, 1869, to an area of 81 square miles, 9 miles square; and *reduced* by act of Congress approved June 9, 1874, to an area of 30 square miles and 491.48 acres. May 1, 1882, the Secretary of War authorized the abandonment of the post, and directed that the reservation thereat be reported for the action of Congress. The abandonment was reported by the Lieutenant-General May 22, 1882, the papers being sent to the Secretary's office May 25, 1882.

The buildings at the abandoned post, except the hospital and ice-house, which were torn down and the material removed to other stations, were sold at public auction September 29, 1882, and military custody of same ceased November 1, 1882.

In obedience to your instructions of November 23, 1882, attention is again called to the case of

FORT WILKINS, MICH.,

and in this connection to Senate Report No. 666, Forty-seventh Congress, first session (copy herewith), publishing War Department letter of May 12, 1882, to Hon. F. M. Cockrell, of the Senate Military Committee, and *full report* of this office in the matter, dated May 10, 1882.

In the case of *Pagosa Springs*, Colo. (heretofore directed to be reported to Congress), action has been *suspended*, in compliance with your instructions of the 9th instant, and special report called for.

I have the honor to be, sir, very respectfully, your obedient servant,

R. C. DRUM,
Adjutant-General.

The Hon. SECRETARY OF WAR.

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[House Ex. Doc. No. 39, Forty-seventh Congress, first session.]

Message from the President of the United States, transmitting a communication from the Secretary of War relative to the disposal of abandoned military reservations.

JANUARY 26, 1882.—Referred to the Committee on Military Affairs and ordered to be printed.

To the Senate and House of Representatives:

I transmit herewith, for the consideration of Congress, a communication from the Secretary of War, reporting a list of reservations which are no longer needed for military purposes, and setting forth the necessity for such legislation as will provide for their disposal.

CHESTER A. ARTHUR.

EXECUTIVE MANSION,
January 26, 1882.

WAR DEPARTMENT.
Washington City, January 17, 1882.

I have the honor to transmit herewith (with a request that the same be laid before Congress) reports of the Adjutant-General, dated the 8th and 15th ultimo, together with accompanying papers, in regard to the following-named military reservations, to wit: Fort Fetterman, Wyo.; Fort McPherson, Nebr.; Camp Sheridan, Nebr.; Camp Independence, Cal.; Fort Hartsuff, Nebr.; Fort Benton, Mont.; Hot Springs, Ark.; Fort Steilacoom, Wash.; Whipple Barracks, Ariz.; Coal Reservation on Sulphur Creek, Wyo.; Fort Dodge, Kans.; Fort Wallace, Kans.; and Fort Lyon, Colo.

These reservations are reported as no longer of any use for military purposes, and are of them are in addition to those reported to the House of Representatives by my predecessor on the 4th of February last, which report is published in H. Ex. Doc. No. 9, Forty-sixth Congress, Third session (copy inclosed).

At that time twenty-four reservations were reported as no longer needed for military purposes, and authority was asked to dispose of them. It will be seen from the report of the Adjutant-General, of the 8th instant, that the requisite authority was granted in but two cases, so that, including those now reported, there are thirty-one useless military reservations in the custody of this department awaiting the requisite authority of law to dispose of them. These reservations comprise a total area of about 543,312.65 acres. (See list hereto attached.)

In this connection attention is invited to the remarks of my predecessor, contained in the letter above mentioned, presenting fully the necessity for early action in this class of cases.

I would respectfully renew the recommendations contained in said letter, and would ask that authority be granted during the present session of Congress to dispose of the reservations that have been reported as no longer needed for military purposes, and that a general law be passed authorizing the Secretary of War to transfer such military sites as are or may hereafter become useless for military purposes to the custody of the Secretary of the Interior, for sale to the highest bidder, after appraisement, or for disposition under the general land laws, or such other disposition as may be deemed to be for the best interests of the United States.

In view of the importance of this subject, I beg to request that this letter and the accompanying papers, if transmitted to Congress, be printed.

I am, sir, very respectfully, your obedient servant,

ROBERT T. LINCOLN,
Secretary of War.

The PRESIDENT.

List of the military reservations reported in the foregoing letter, and in the letter of the Secretary of War of February 4, 1881.

	Area in acres.
Fort Benton, Mont., discontinued 1881, 3.24 square miles	2,073.60
Bois Blanc Island, Mich., reserve, includes about one-half of the island	9,199.36
Fort Butler, N. Mex	76,800
Camp Cady, Cal., discontinued 1871	1,562
Fort Crittenden, Utah, abandoned 1861	93,703.67
Camp Crittenden, Ariz., abandoned 1873	3,276.48
Coal reservation on Sulphur Creek, Wyo	99.17
Fort Fetterman, Wyo., post reserve to be reduced from 60 square miles to 12½ square miles, leaving to be disposed of 47½ square miles	30,400
Hay reserve about 20 square miles	12,800
Old Wood reserve, about	25,000
Camp Goodwin, Ariz., abandoned 1871, about 9 square miles	5,760

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	Area in acres.
Old Camp Grant, Ariz., abandoned 1873	2,031.70
Fort Hartsuff, Nebr., abandoned 1881, post reserve	1,218.22
Wood and hay reserve	2,033.19
Hot Springs, Ark., abandoned 1881	6.765
Camp Independence, Cal., abandoned 1877, post reserve (about 120 acres), wood reserve (4 square miles), grazing reserve (about 4 square miles)	5,240
Island in Missouri River, east of Kansas City, abandoned 1872	54.70
Fort Larned, Kans., abandoned 1878, 16 square miles	10,240
Fort McPherson, Nebr., abandoned 1880, all of the reserve (except the national cemetery), about	19,000
Fort McRae, N. Mex., 4 square miles	2,560
Oglethorpe barracks, Savannah, Ga., about ¾ of an acre in the center of the city	.75
Fort Randall, Dak., part of reserve north of Missouri River, about	25,000
Fort Rice, Dak., abandoned 1879, about 175 square miles	112,000
Rush Lake Valley, Utah, about	5,131.47
Fort Sedgwick, Colo. and Nebr., abandoned 1871, 64 square miles	40,960
Camp Sheridan, Nebr., abandoned 1881, $28\frac{3}{640}$ square miles	18,225
Fort Steilacoom, Wash., abandoned 1868	289
Camp Three Forks, Owyhee, Idaho, abandoned 1871; post, wood, grazing, and water reserves, about 8 square miles	5,120
Fort Verde, Ariz., garden tract, about	3,000
Whipple Barracks, Ariz., timber reserve	720
Fort Wilkins, Mich., abandoned 1870, at Copper Harbor, on Lake Superior, about	320
Fort Dodge, Kans., area of reservation, as declared, 43,461 acres, reduced by act approved December 15, 1880, about 28,800 acres, leaving about	14,661
Fort Wallace, Kans	8,960
Fort Lyon, Colo., area of reservation, as declared, 5,875 acres, reduced by act approved June 23, 1874 (depot and right of way), 10 acres, leaving about	5,865
Total	543,312.689

ADJUTANT-GENERAL'S OFFICE,
Washington, December 8, 1881.

SIR: Referring to the list of military reservations reported by this office January 5, 1881, as no longer needed for military purposes, but remaining in the custody of the War Department in the absence of the necessary legislation for their disposition, which list was transmitted to the House of Representatives in War Department letter of February 4, 1881, and published in H. Ex. Doc. No. 90, Forty-sixth Congress, third session, I have the honor to invite attention to the fact that out of the twenty-four reservations and portions of reservations embraced in said list only two have been the subject of Congressional action, viz, those of Camp Crook and Fort Reading, California. [*Vide* act approved February 15, 1881, 21 Stats., p. 325.]

Regarding certain of these reservations, it is remarked that some of the conditions have changed since the date of my former report, and the following information in relation thereto is accordingly supplied to supplement said report.

FORT FETTERMAN, WYO.

(Reduction of post reservation and relinquishment of old wood reserve heretofore recommended.)

It has been since reported that the hay reserve for this post, declared by the President August 29, 1872, and embracing an area of about 20 square miles, consisting of "the bottom lands and adjacent and pertaining to Deer Creek, Wyoming, from its mouth to the foot of the first high range of hills," is not now available for military purposes by reason of its unprotected condition, and its distance from the post from 20 to 25 miles to the west.

The department and division commanders and the General of the Army having concurred in recommending its restoration to the condition of public lands, it is now reported, under the Secretary's instructions of May 5, 1881, with a view to securing the action of Congress, which the department has held to be requisite in all such cases of military reservations duly declared by the President, and which view has been confirmed by an opinion of the Attorney-General, dated July 20, 1881, having special reference to the case of this hay reservation.

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FORT M'PHERSON, NEBR.

The buildings at this post were sold May 23, 1881, under authority from the War Department, and military custody of same ceased July 1, 1881.

Within the limits of the military reservation at Fort McPherson is a tract of 107 acres set aside by the President for a national cemetery, as announced in General Orders No. 103 of October 13, 1873, from this office. These grounds, the Quartermaster-General reports, should be reserved from sale forever, as originally intended.

A copy of correspondence in this matter, including the General Order and a plat of the cemetery grounds, is inclosed herewith.

CAMP SHERIDAN, NEBR.

In this case special report was also made to both houses of Congress by War Department letter of February 3, 1881, accompanied with map of the reservation, &c., and the authority of Congress was requested to transfer the reservation to the Interior Department for disposition under the land laws, the abandonment of the post having been ordered by the Secretary of War.

The post was discontinued May 1, 1881, pursuant to General Orders No. 8, Headquarters Department of the Platte, April 20, 1881—copy herewith—which also provided, under authority from the War Department, for the removal or sale of the buildings at the post and the removal of the bodies interred in the post cemetery.

The buildings were accordingly sold August 2, and military custody of same ceased August 31, 1881.

CAMP INDEPENDENCE, CAL.

The sale of the buildings at this post was ordered by the Secretary of War, December 6, 1881, in accordance with recommendations of the Quartermaster-General and the chief quartermaster, Military Division of the Pacific.

I have also the honor, by your direction, to report the following additional cases of useless military reservations, with a view to their being brought to the attention of Congress:

FORT HARTSUFF, NEBR.

This post was established September 5, 1874, as Camp on North Fork of Loup River; name changed to present designation by General Orders No. 8, Headquarters Military Division of the Missouri, December 9, 1874. It is located on the left bank of the North Fork of Loup River, about 75 miles north of Kearney station on the Union Pacific Railroad.

Two reservations have been declared for use of the post by orders of the President, dated August 17 and September 16, 1874. On the latter the post was built, while the former has been used for supplying wood and hay.

The limits of these reservations are announced in General Orders No. 18, Headquarters Department of the Platte, October 19, 1874—copy herewith—the area of the post reserve being 1,218.22 acres, and that of the wood and hay reserve 2,033.19 acres. It appears that of the latter reserve an area of 603.38 acres had been entered by settlers prior to the President's order of reservation, and December 4, 1877, the Department reported to the House of Representatives, that so much of the reservation as contained the improvements of said settlers could be relinquished without detriment to military interests, at the same time transmitting the papers in the case with maps, &c., and recommending legislation to that end. (*Vide* Senate Report No. 709, Forty-fifth Congress, third session, to accompany act H. R. 3874.) There does not appear, however, to have been any final action in this matter up to the close of the Forty-sixth Congress and the discontinuance of the post has now rendered this entire reserve, as well as the post reservation, useless for military purposes. The establishment of Fort Niobrara, Nebraska, rendering the further occupation of Fort Hartsuff unnecessary, its abandonment was authorized by the Secretary of War, and accordingly directed by General Orders No. 9, Headquarters Department of the Platte, April 23, 1881, to take effect May 1, 1881. The buildings at the abandoned post were sold July 20, 1881, pursuant to authority from the War Department, and military custody of same ceased July 31, 1881.

The removal of the remains in the post cemetery to the nearest national cemetery has also been ordered.

FORT BENTON, MONT.

This post was established in October, 1869, in buildings belonging to the Northwest Fur Company, which were rented by the Government. It was located on the left bank of the Missouri River, and at the head of navigation thereon.

A military reservation of 3.24 square miles was declared at this site by the President December 1, 1869.

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For several years past the troops have been quartered in the town of Fort Benton (adjoining the reservation on the west), in rented buildings, and the old fort appears to have fallen into ruins.

The Post of Fort Benton was finally discontinued May 31, 1881, pursuant to Special Orders No. 77, May 2, 1881, from Headquarters Department of Dakota, the troops being transferred to Fort Shaw.

Inclosed herewith is copy of report showing that the reservation declared December 1, 1869, is no longer needed for military purposes, and containing data relative to the boundaries of the reservation, the buildings thereon, &c.

HOT SPRINGS, ARK.

A military reservation was declared by the President November 17, 1880, as a site for a post, which it was then proposed to build at this place.

The reservation included all of square or block numbered 94 on the official survey of the government reservation at Hot Springs, embracing an area of 6.765 acres, with boundaries as announced in General Orders No. 6, Headquarters Department of Arkansas, April 7, 1881, copy herewith. Troops had been stationed at Hot Springs, in rented buildings, since October 2, 1878, to guard the government interests there, and recommendation was made to the Forty-sixth Congress by War Department letters of January 3, 1881, for a special appropriation to build a permanent post, but no appropriation being made, it was subsequently decided by the department that no military structures could be erected at Hot Springs, and orders were given August 20, 1881, to withdraw the troops at the earliest practicable period.

The troops were accordingly withdrawn September 22, 1881, and the relinquishment of the military reservation is recommended by the General of the Army, as it fulfills no military use.

FORT STEILACOOM, WASH.

Post established August 28, 1849, near the southeastern limit of Puget Sound, adjoining the town of same name; the garrison was finally withdrawn April 22, 1868, and the buildings were sold January 15, 1870, to James Scott and others, commissioners for Washington Territory.

The reservations for this post, declared by the President April 8, 1861, consisted of three tracts, viz: Post reserve, 640 acres; fuel reserve, 160 acres; garden reserve, 126.27 acres.

The House of Representatives was advised by War Department letter of March 5, 1872, that the reservations at Fort Steilacoom were no longer required for military purposes.

By act of Congress approved April 15, 1874 (18 Stats., p. 29), a portion of the post reserve was donated to the Territory of Washington for the use and purpose of an insane asylum.

From reports of the General Land Office it appears that other portions of this reserve, as well as portions of the fuel and garden reserves, are covered by donation and other claims, leaving subject to the control of the War Department 99.78 acres of the post reserve, 104.59 acres of the fuel reserve, and 84.64 acres of the garden reserve. Concerning these tracts the Commissioner of the General Land Office reported June 13, 1881, that there was no authority under existing laws for the disposition thereof.

Copy of correspondence on the subject is inclosed herewith, including reports and map from the General Land Office, showing the present status of the lands embraced within the limits of these reservations.

WHIPPLE BARRACKS, ARIZ.

Timber reservation.—This reservation, located six miles south of the post and containing an area of 720 acres, was declared by the President June 20, 1873, the purpose being to enable the Quartermaster's Department to procure lumber required for construction and completion of certain posts in the Department of Arizona at a reasonable rate.

It appears that the government has not, for the past few years, used any timber from this reserve for building or other purposes, and a board of officers, convened by orders of July 5, 1881, from department headquarters, after examination of the reserve and due consideration of the question of its utility, recommended its relinquishment, and this recommendation was concurred in by the department commander and the Quartermaster-General.

Inclosed is copy of brief in the matter, prepared in this office September 15, 1881; also of War Department letter, dated September 28, 1881, to the Commissioner of the General Land Office, in which it is held that the authority of Congress is necessary to restore this reserve to the public domain.

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COAL RESERVATION ON SULPHUR CREEK, WYOMING TERRITORY.

This reservation, which is located 24 miles southwest of Fort Bridger, was declared by the President April 6, 1859, upon the recommendation of the commanding officer of that post, to embrace the coal mines on Sulphur Creek.

It is in the east half of section 35, township 14 north, range 119 west of the sixth principal meridian, half a mile from the Union Pacific Railroad, and embraces an area of 99.17 acres.

I inclose copy of reports, map, &c., in case of this reservation, showing that it is not now used nor desired for military purposes, and that there are no government buildings or improvements thereon.

Its restoration to the public lands under the control of the Interior Department is recommended by the Quartermaster-General.

I have the honor to be, sir, very respectfully, your obedient servant,

R. C. DRUM,
Adjutant-General.

The Hon. SECRETARY OF WAR.

ADJUTANT-GENERAL'S OFFICE,
Washington, December 15, 1881.

SIR: In connection with report of this office of December 8, 1881, on the subject of useless military reservations, I have the honor to inclose copy of recommendations of the Lieutenant-General and the General of the Army relative to the early abandonment and disposition of Fort Lyon, Colo., and Forts Dodge and Wallace, Kans., which, although still garrisoned, are reported as having fulfilled the purposes for which they were established and as being no longer of use for military purposes.

Fort Lyon, Colo., was established in June, 1867, and is located on the north bank of the Arkansas River, one mile from the town of Las Animas, which is on the opposite bank of the river on the Atchison, Topeka and Santa Fé Railroad.

A military reservation was declared at the post by the President's order of September 1, 1868, with an area of 9 square miles and about 115 acres, as announced in General Orders No. 25, of August 13, 1868, Department of the Missouri (copy inclosed).

By act of Congress, approved June 23, 1874 (18 Stats., p. 274), the right of way across the reservation was granted the Arkansas Valley Railway Company (branch of the Kansas Pacific R. R.), together with ten acres of ground for depot and other purposes.

The map of location of right of way, &c., was approved by the Secretary of War March 5, 1875, and a copy filed in the Interior Department.

Fort Lyon is a four-company post, with stabling for 180 animals.

Several of the buildings are of stone, the others being of frame and adobe.

Fort Dodge, Kans., was established in 1865, and is located on the north bank of the Arkansas River, about 5 miles east of Dodge City, on the Atchison, Topeka and Santa Fé Railroad.

A military reservation was declared at the post by the President's order of June 22, 1868, with boundaries as described in General Orders No. 17, of May 29, 1868, Department of the Missouri (copy herewith), embracing an area of 67 square miles and 581 acres.

Under act of Congress approved March 3, 1863 (12 Stats., p. 772), a right of way across this reservation was laid out by the Atchison, Topeka and Santa Fé Railroad Company in 1873, and by act approved December 15, 1880 (copy herewith), the Secretary of the Interior was directed to offer to actual settlers, in accordance with the homestead laws, the portion of the reservation lying north of the railroad right of way—the right to purchase an additional tract not exceeding 160 acres being also granted to the railroad company.

The quantity of land thus taken from the reservation is estimated at not less than 45 square miles, but no report of the result of the survey provided for in the act of Congress has yet been received from the Interior Department.

Fort Dodge has quarters for three companies. The buildings are partly of stone, constructed in 1867; the others, erected since, being of adobe and frame.

Fort Wallace, Kans., was established in 1866, and is located on the north bank of the Smoky Hill River, 3 miles east of the junction of Pond Creek and 2 miles southeast of Wallace Station, on the Kansas Pacific Railroad.

A military reservation was declared at the post by the President's order of August 28, 1868, with an area of 14 square miles, and boundaries as announced in General Orders No. 24, of August 8, 1868, Department of the Missouri (copy inclosed).

Fort Wallace is a three-company post, with stabling for one company of cavalry.

Several of the buildings are of stone, the others being of frame.

Wallace Station, on the Kansas Pacific Railroad, is within the limits of the military

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reservation, and the railroad company claim the alternate (odd numbered) sections upon their relinquishment for military purposes, under the acts making grants of land to the company.

I have the honor to be, sir, very respectfully, your obedient servant,

R. C. DRUM,
Adjutant-General.

The Hon. SECRETARY OF WAR.

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, July 28, 1881.

SIR: I have the honor to invite attention to the following extract from letter of the chief quartermaster, Department of the Platte, dated February 16, 1881, in which he inclosed report showing the character and condition of the public buildings at the abandoned post of Fort McPherson, Nebr., and suggested that orders be given for their disposition.

"There is a national cemetery near the post, but none of the buildings thereat should be sold, nor are they included in this list.

"The post is situated on a military reservation * * * and within such reservation is a reservation set apart as a national cemetery, as announced by General Orders No. 103, War Department, series of 1873.

"In my surrender of the lands to the Interior Department such part of the cemetery reservation as needed, together with right of way thereto, should be reserved."

The sale of the buildings at the post, having been ordered by the Secretary of War, was effected May 23, 1881, as reported by the department chief quartermaster in letter dated May 28, of which a copy has been furnished your office.

The military reservation has been reported to Congress as no longer needed, with request for the requisite authority of law for its disposition (*vide* H. Ex. Doc. No. 90, Forty-sixth Congress, third session).

In view of the foregoing, it is respectfully suggested that full and definite report be obtained for the information of the Secretary of War relative to the retention of the national cemetery tract, in whole or in part, with the necessary right of way or approaches to same through the military reservation, said report to be accompanied with proper plat and description, in order that the matter may be again laid before Congress at its approaching session, with such further recommendation as may be called for.

I am, sir, very respectfully, your obedient servant,

R. C. DRUM,
Adjutant-General.

The QUARTERMASTER-GENERAL.

WAR DEPARTMENT, QUARTERMASTER-GENERAL'S OFFICE,
Washington, D. C., August 6, 1881.

GENERAL: In answer to your communication of the 28th ultimo, in regard to the sale of the military reservation of Fort McPherson, Nebr., I have the honor to state that the grounds set aside for the uses of the national cemetery, as described in General Order 103, Adjutant-General's office, 1873, should be reserved from sale forever, as then intended and ordered. See report of Quartermaster-General of September 19, 1873, and indorsements thereon, copy herewith. Also a copy of the plat showing the lands set apart for the national cemetery.

The tract contains 107 acres.

Very respectfully, your obedient servant,

M. C. MEIGS,
Quartermaster-General, Bvt. Major-General, U. S. Army.

The ADJUTANT-GENERAL.

WAR DEPARTMENT, QUARTERMASTER-GENERAL'S OFFICE,
Washington, D. C., September 19, 1873.

SIR: On the 28th of March, 1872, the Secretary of War authorized the inclosing of the soldiers' cemeteries at Fort Kearney and Sedgwick with stone walls, but as it subsequently appeared that to carry out this project would involve an outlay of some $30,000, I called for an estimate of the cost of removing the remains interred in the above-mentioned cemeteries to some permanent post. Fort McPherson, Nebr., was suggested, and the cost of removal estimated at $3,000, if government transportation were used to convey the remains.

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The case was resubmitted to the Secretary of War, who then directed that a national cemetery be established at Fort McPherson, and approved of the removal of the bodies to that place.

A board of officers was accordingly convened by order of the department commander, General Ord, to fix the location, and its report is inclosed herewith, together with a plat of the proposed cemeterial reservation.

If a farm of 107 acres is reserved as cemetery grounds, and 6 acres are inclosed as suggested, the use of the farm and the pay now allowed a superintendent will for all time enable the United States to keep up the cemetery.

The land is now of little value.

I recommend that the proceedings of the board be approved and the cemetery set aside in General Orders, by authority of the executive, as a national cemetery, and this being done, that 6 acres be inclosed by a wall and laid out as a burying ground in which the remains of those to be removed and reinterred shall be collected.

Very respectfully, your obedient servant,

M. C. MEIGS,
Quartermaster-General, Brt. Maj. General, U. S. A.

The Hon. SECRETARY OF WAR.

[First indorsement.]

WAR DEPARTMENT.
October 7, 1873.

The proceedings of the board are approved, and the Adjutant-General will issue the General Order as recommended by the Quartermaster-General, to whom these papers will be returned.

WM. W. BELKNAP,
Secretary of War.

[Second indorsement.]

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, October 20, 1873.

Respectfully returned to the Quartermaster-General in accordance with first indorsement, and inclosing copy of General Order No. 103, War Department, Adjutant-General's Office, Washington, October 13, 1873, setting apart the land herein referred to as a national cemetery.

A copy of the order and accompanying plat have been transmitted to the Interior Department in order that proper note may be made in the General Land Office.

E. D. TOWNSEND,
Adjutant-General.

[General Orders No. 103.]

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, October 13, 1873.

By direction of the President, a tract of land—within the limits of the present military reservation at Fort McPherson, Nebr.—with boundaries as hereinafter described, is hereby set apart as a national cemetery.

BOUNDARIES.

Beginning at a point on the south bank of the South Platte River, marked by a wooden post, about four thousand and four hundred (4,400) feet from the flag-staff at Fort McPherson, and running thence westward up the south bank of the river thirteen hundred and twenty (1,320) feet to a wooden post; thence southward to the table-land of the ridge four thousand four hundred and forty (4,440) feet to a wooden post; thence eastward along the table of the ridge eight hundred (800) feet to a wooden post; thence northward four thousand and four hundred (4,400) feet to the point of beginning—the whole tract containing about one hundred and seven (107) acres.

By order of the Secretary of War:

E. D. TOWNSEND,
Adjutant-General.

[General Orders No. 8.]

HEADQUARTERS DEPARTMENT OF THE PLATTE,
Fort Omaha, Nebraska, April 20, 1881.

The post of Camp Sheridan, Nebraska, will, under the instructions of the Lieutenant-General Commanding the Division, be discontinued May 1, 1881.

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Company M, 5th Cavalry, and Company E, 9th Infantry, now stationed thereat, will take post at Fort Robinson, Nebr.

Maj. William T. Gentry, 9th Infantry, will proceed to Fort Fetterman, Wash., and there take post.

Capt. Henry M. Cronkhite, assistant surgeon, will proceed to Fort McKinney, Wash., and report for duty at that post.

Hospital Steward Thomas N. Gunn will report in person to the commanding officer, Fort Hall, Idaho, for duty.

The quartermaster's and subsistence stores and the ordnance and ordnance stores, not in hands of the troops, at Camp Sheridan, will be sent to Fort Robinson, Nebr., or distributed to neighboring posts at which they are most required.

The medical and hospital property at Camp Sheridan will be sent to Fort Robinson, Nebr., with the following exceptions: the hospital library including the Medical Journal at the post, will be sent to the medical director of the department—the hospital records to the Surgeon-General U. S. A., Washington, D. C. The remaining records will be carefully arranged for further reference, boxed up, and forwarded to these headquarters, as follows: Those pertaining to the Quartermaster's Department to the chief quartermaster; those pertaining to the Subsistence Department to the chief commissary of subsistence; all others to the assistant adjutant-general.

Under the instructions of the Secretary of War, the bodies interred at Camp Sheridan Cemetery, will be removed to, and reinterred in the cemetery near Fort Robinson, Nebr.

All buildings or building material which can with economy be removed to the posts of Forts Robinson or Niobrara will be transported to those posts and used in construction and repairs—the remainder will be sold by the Quartermaster's Department.

A detachment of one officer and ten enlisted men from the present garrison will remain at Camp Sheridan, after May 1st, 1881, until all public property thereat is removed. On completion of this duty the detachment will join its company.

By command of Brigadier-General Crook.

ROBERT WILLIAMS,
Assistant Adjutant-General.

[General Orders No. 18.]

HEADQUARTERS DEPARTMENT OF THE PLATTE,
Omaha, Nebraska, October 19, 1874.

I. under date of September 16, 1874, the President has declared sections 2 and 10, township 20 N., range 15 W., as a reservation for the site of the post on the north fork of the Loup River, Nebr.; and under date of August 17, 1874, he has declared sections 9 and 15, and such parts of sections 10, 11, and 14, township 21 N., range 16 W., as lie south of the Loup River and its tributary, the Calamus River, as a reservation for supplying wood and hay to the post; and the same is hereby announced for the information of all concerned.

* * * * * * *

By command of Brigadier-General Ord.

GEO. D. RUGGLES,
Assistant Adjutant-General.

HEADQUARTERS OF THE ARMY, ADJUTANT-GENERAL'S OFFICE,
Washington, June 29, 1881.

To the COMMANDING GENERAL DEPARTMENT OF DAKOTA,
(Through headquarters Military Division of the Missouri.)

SIR: The troops lately stationed in the town of Benton, Mont., having been ordered to Fort Shaw, as appears by your indorsement of the 16th ultimo, upon petition of citizens protesting against the discontinuance of the former post, I have the honor, by direction of the General of the Army, to inquire whether there is any probability that the United States military reservation at Fort Benton, near the town, declared by the President's order of December 1, 1869, will be required in the future for military purposes; also, as to the number, character, present condition, and approximate value of improvements on said land.

I am, sir, very respectfully, your obedient servant,

R. C. DRUM,
Adjutant-General.

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[First indorsement.]

HEADQUARTERS MILITARY DIVISION OF THE MISSOURI,
Chicago, July 1, 1881.

Respectfully transmitted to the commanding general Department of Dakota.
By command of Lieutenant-General Sheridan.

WM. D. WHIPPLE,
Assistant Adjutant-General.

[Second indorsement.]

HEADQUARTERS DEPARTMENT OF DAKOTA,
Fort Snelling, Minn., July 6, 1881.

Respectfully referred to the commanding officer, District of Montana, for remark.
By command of Brigadier-General Terry.

SAMUEL BRECK,
Assistant Adjutant-General.

[Third indorsement.]

HEADQUARTERS DISTRICT OF MONTANA,
Helena, Mont., July 26, 1881.

Respectfully returned to the Adjutant-General, Department of Dakota. I am of opinion that the military reservation at Fort Benton will not in the future be required for military purposes. The improvements on the reservation consist of one frame stable, 28 by 128 feet, condition good, approximate value $500; also one adobe building (the old post of the American Fur Company), 25 by 35 feet, present condition bad, roof and part of wall broken. This building is of little, if any, value for sale, apart from the land, and of no certain value under any condition of sale. There are two small log houses and one small frame house on the reservation belonging to citizens, who, it is reported, placed such buildings on the reservation by permission of the then commanding officer.

There appears to have been no record of this matter at Fort Benton. The frame stable will be sold at public auction August 10, in accordance with directions, by indorsement of June 27, 1881, from headquarters Department of Dakota, on letter of June 11, 1881, from the Quartermaster-General to the chief quartermaster Military Division of the Missouri.

THOMAS H. RUGER,
Colonel Eighteenth Infantry, Commanding District.

[Fourth indorsement.]

HEADQUARTERS DEPARTMENT OF DAKOTA,
Fort Snelling, Minn., August 2, 1881.

Respectfully returned to the Adjutant-General of the Army, through headquarters Military Division of the Missouri, concurring in the indorsement of Colonel Ruger.

ALFRED H. TERRY,
Brigadier-General, Commanding.

[Fifth indorsement.]

HEADQUARTERS MILITARY DIVISION OF THE MISSOURI,
Chicago, August 6, 1881.

Respectfully returned to the Adjutant-General of the Army.
In the absence of the Lieutenant-General, commanding.

WILLIAM D. WHIPPLE,
Assistant Adjutant-General.

[Sixth indorsement.]

ADJUTANT-GENERAL'S OFFICE,
Washington, August 22, 1881.

Respectfully referred to the Quartermaster-General for remark and recommendation relative to the disposition of the military reservation and the buildings remaining thereon, attention being invited to the third indorsement hereon.
By order of the Secretary of War.

R. C. DRUM,
Adjutant-General.

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[Seventh indorsement.]

QUARTERMASTER-GENERAL'S OFFICE,
Washington, September 5, 1881.

Respectfully returned to the honorable Secretary of War through Adjutant-General of the Army.

I recommend that it be turned over to the Interior Department for such disposition as may by that department be legally made of it.

M. C. MEIGS,
Quartermaster-General, Brt. Maj. Gen., U. S. A.

[Eighth indorsement.]

HEADQUARTERS OF THE ARMY,
Washington, September 19, 1881.

Respectfully submitted to the Secretary of War.

A military reservation for Fort Benton, Mont., was declared by the President of the United States, under date of December 1, 1869, with boundaries as announced in General Orders No. 77, November 6, 1869, from headquarters Department of Dakota, copy inclosed, the area being 3.24 square miles—about 1 mile wide and 3 miles long.

Upon the occupation of the post by United States troops in October, 1869, the buildings which belonged to the "Northwest Fur Company" were rented by the government at $167 per month.

For several years past the troops have been stationed in the town of Fort Benton, adjoining the reservation on the west, and the old "fort" appears to be in ruins (*vide* accompanying transcript).

By Special Orders No. 77, paragraph 4, May 2, 1881, from headquarters Department of Dakota, the "post of Fort Benton" was discontinued, and the rented buildings directed to be turned over to the owners by May 31, 1881.

In response to an inquiry of the Adjutant-General, the district and department commanders now unite in reporting that the reservation will not, in the future, be required for military purposes.

As to condition of buildings on the reservation, attention is invited to report of the district commander—third indorsement hereon.

The Quartermaster-General recommends that the reservation be turned over to the Interior Department for such disposition as may by that department be legally made of it; but under the ruling of the War Department, and in view of the recent opinion of the Attorney-General in case of the Fort Fetterman hay reservation, it will require the authority of Congress to dispose of it.

Under a House resolution asking what military posts could be disposed of, the abandonment of Fort Benton (among others) was recommended by the division commander, and in letter of February 24, 1872, the Secretary of War informed the House that the reservation at this post could be disposed of without injury to the service. No final action appears to have been taken by Congress in the matter.

W. T. SHERMAN,
General.

Transcript from E. B., 29, 368.

APRIL 10, 1880.

Commanding general, Department of Dakota, forward (through commanding general, Division of the Missouri, April 14) remonstrance of J. G. Baker & Co., and other citizens of Fort Benton, Mont., to a certain petition that has been, or is soon to be, forwarded to the President, praying that the military reservation at Fort Benton be restored to the public domain.

(MEMO.—A. G. O. April 19, 1880.—The petition in question does not appear to have reached this office as yet. The post is still garrisoned.)

[Third indorsement.]

Respectfully submitted to the honorable Secretary of War for file.

No petition, such as the within refers to, has yet reached this office. I was at Benton three years ago. A very small garrison occupied a hired house in the town. The old Fur Company fort of adobes was in ruins and falling down. The district commander, General Ruger, will be the best judge of the necessity for maintaining Benton as a post or reservation.

W. T. SHERMAN,
General.

HEADQUARTERS OF THE ARMY,
Washington, April 19, 1880.

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[General Orders, No. 77.]

HEADQUARTERS DEPARTMENT OF DAKOTA,
Saint Paul, Minn., November 6, 1869.

General Orders No. 62, current series, from these headquarters, is modified as follows: In order that old Fort Benton may be made use of as a military post, the following reservation embracing it is declared, subject to the approval of the Secretary of War, viz:

Take for the initial point a stake in the southwest corner of the Fort lot, planted in the fence along the river street, five hundred and seventy-five (575) feet from the southwest corner of Fort Benton—through this stake run a due north and south line across the river, extending it on the north side of the Missouri to the Teton River. Upon this north and south line measure a distance of five hundred (500) yards south from the south bank of the Missouri River, through which point run an east and west line, extending east one (1) mile from the point last determined, thence north to the Teton River—thence along the bank of said river to the intersection of the north and south line herein mentioned, thence south to the place of beginning.

The commanding officer of Fort Benton will cause to be erected permanent cut stones, firmly imbedded in the ground, at each of the points heretofore described; on the inner faces of each stone the letters "U. S." will be painted or cut, and on the outer face of each stone the words "Military Reservation."

By command of Maj. Gen. Hancock.

R. CHANDLER,
Acting Assistant Adjutant-General.

[General Orders No. 6.]

HEADQUARTERS DEPARTMENT OF ARKANSAS,
Little Rock, Arkansas, April 7, 1881.

In accordance with instructions from headquarters of the Army, dated November 29, 1880, the military reservation of Hot Springs, Ark., declared by the President in Executive order of November 17, 1880, is announced. This reservation includes all of square or block numbered ninety-four (94) on the official survey of the Government reservation at Hot Springs, Ark. The area is 6.765 acres, more or less, and the boundaries thereof are defined as follows:

Beginning at a point S. 31 degrees, 6 minutes, 23 seconds. W. 2751.83 feet from a granite monument marked "30 U. S. H. S. R.," planted at angle 30, U. S. H. S. R., at the S. and W. point of the Hot Water Reservation, and running thence S. 40 degrees, 55 minutes, E. 474 feet; thence S. 34 degrees, 55 minutes, W. 560 feet; thence N. 39 degrees, 35 minutes, W. 614 feet; thence N. 48 degrees, 55 minutes, E. 530 feet to the point of beginning.

The courses given are true, the magnetic variation being 7 degrees, 45 minutes east.

Latitude 34 degrees, 31 minutes, 15 seconds (approximate).

Longitude 93 degrees W. from Greenwich (approximate).

Stone monuments 12x12, marked U. S. M. R., will be planted at each corner.

By order of Brevet Brigadier-General R. S. Mackenzie:

HUGH G. BROWN,
Acting Assistant Adjutant-General.

REPORT IN THE MATTER OF THE UNITED STATES MILITARY RESERVATION AT FORT STEILACOOM, WASH.

This reservation, consisting of three tracts located near the southeastern limit of Puget Sound, was made for military purposes by the President's order of April 8, 1861, as follows:

Tract No. 1, containing area of 640 acres.

Tract No. 2, containing area of 160 acres.

Tract No. 3 (garden) area of *97.72 acres.

The troops were withdrawn in 1868, since which time Fort Steilacoom has not been garrisoned.

By War Department letter of March 5, 1872, the House of Representatives was informed that the reservation was no longer needed for military purposes, and on March

*From report of Engineer Bureau, January, 1879, as to reservations in Washington Territory. From map furnished by Engineer Bureau, March 8, 1881, area of garden tract appears to be 126½ acres, which agrees with Land Office report dated February 14, 1881. Plat furnished with Land Office letter of October 5, 1881, shows area by actual survey 126.27 acres.

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19, 1872, the department informed the House that the buildings were sold January 15, 1870, to James Scott and others, commissioners of Washington Territory. (*Vide* H. Ex. Docs. Nos. 175 and 202, second session, Forty-second Congress.)

A portion of the reserve was donated to the Territory of Washington for the use of the insane asylum by act of Congress approved April 15, 1874. (Published in General Order No. 32 of 1874; copy herewith.)

[General Orders No. 32.]

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, April 27, 1874.

The following acts of Congress are published for the information and government of all concerned:

* * * * * * *

II.—AN ACT to donate the military reservation at Fort Steilacoom to the Territory of Washington for the use of the insane asylum.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section thirty-three of township numbered twenty north, of range numbered two east of Willamette meridian, embracing a portion of Fort Steilacoom military reservation, and the military barracks thereon, in the county of Pierce and the Territory of Washington, be, and the same is hereby, donated to the said Territory of Washington, for the use and purpose of an asylum for the insane of said Territory, and for no other purpose: *Provided*, That this act shall not be construed or have the effect to impair any rights of any person in or to any portion of said lands acquired under any of the land laws of the United States.

Approved April 15, 1874.

* * * * * * *

By order of the Secretary of War.

E. D. TOWNSEND,
Adjutant-General.

It is respectfully suggested that the status of the lands be ascertained from the General Land Office, and that a map thereof be obtained to the end that if any portions still remain in the custody of the War Department, and it shall be determined that they are no longer needed for garrison or defensive purposes, proper measures may be taken looking to their relinquishments.

In this connection attention is invited to act of Congress approved February 28, 1877, relative to *donation claims* in Oregon and Washington Territories, under act of September 27, 1850. (Published in General Orders No. 24, of 1877; copy herewith.)

[General Orders No. 24.]

HEADQUARTERS OF THE ARMY,
ADJUTANT-GENERAL'S OFFICE,
Washington, March 20, 1877.

The following acts of Congress are published for the information and government of all concerned:

I. AN ACT for the relief of certain claimants under the donation land law of Oregon, approved September twenty-seventh, eighteen hundred and fifty.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the claims of such persons who were duly qualified thereto, and made bona fide settlements upon lands in the State of Oregon and Washington Territory, under the provisions of the act of Congress, approved September twenty-seventh, eighteen hundred and fifty, entitled "An act to create the office of surveyor-general of the public lands in Oregon, and to provide for the survey, and to make donations to settlers of the said public lands," and the legislation supplemental thereto, which have been included, in whole or in part, within the limits of any reservation made by the United States for military purposes subsequent to the date of such settlement and prior to the completion of the period of residence and cultivation required by said act, which reservation has been, or may hereafter be, declared abandoned by the Secretary of War as no longer necessary to the United States for military or other purposes, shall be adjudicated and patented the same as other donation claims arising under said act and supplemental legislation, as though such reservation had never been made: *Provided, however*, That no claim of any settler coming within the purview of this act shall be validated or confirmed the value of whose

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improvements, at the time such reservation was made by the United States, has been ascertained and paid for by the Secretary of War, as required by the aforesaid act of September twenty-seventh, eighteen hundred and fifty, and the legislation supplemental thereto.

Approved February 28, 1877.

* * * * * * *

By command of General Sherman:

E. D. TOWNSEND,
Adjutant-General.

Respectfully submitted.

R. C. DRUM,
Adjutant-General.

ADJUTANT-GENERAL'S OFFICE,
Washington, January 27, 1881.

HEADQUARTERS OF THE ARMY.
Washington, January 27, 1881.

Respectfully submitted to the Secretary of War.

W. T. SHERMAN,
General.

WAR DEPARTMENT,
Washington, February 4, 1881.

SIR: I have the honor to transmit herewith a report from the Adjutant-General, under date of the 27th ultimo, in the matter of the United States military reservation at Fort Steilacoom, Wash.

In accordance with the suggestions of that officer I beg to request that you will procure from the General Land Office and furnish this department information as to the status of the lands comprising said reservation and a map thereof, to the end that if any portions still remain in the custody of the War Department, and it shall be determined that they are no longer needed for garrison or defensive purposes, proper measures may be taken looking to their relinquishment.

Very respectfully, your obedient servant,

ALEX. RAMSEY,
Secretary of War.

The Hon. SECRETARY OF THE INTERIOR.

DEPARTMENT OF THE INTERIOR,
Washington, February 15, 1881.

SIR: Your letter of the 4th instant, in which you ask to be informed of the status of certain lands in the military reservation at Fort Steilacoom, Wash., was received, and referred to the Commissioner of the General Land Office.

I have the honor to transmit herewith copy of his report on the subject yesterday. The paper and diagram accompanying your letter are returned herewith.

Very respectfully,

C. SCHURZ,
Secretary.

The Hon. SECRETARY OF WAR.

DEPARTMENT OF THE INTERIOR, GENERAL LAND OFFICE,
Washington, February 14, 1881.

SIR: I have the honor to acknowledge the receipt, by reference from the department for report, of a letter from the honorable the Secretary of War, dated the 4th instant, inclosing a report from the Adjutant-General, U. S. A., in the matter of the United States military reservation at Fort Steilacoom, Wash., and requesting to be furnished with information as to the status of the lands comprised in said reservation, and a map of the lands, so that if any portion of the same are yet in the custody of the War Department, and it shall be determined that they are no longer needed for garrison or defensive purposes, measures may be taken by the War Department looking to their relinquishment.

In reply I have the honor to report that of the three tracts of land declared by the President, on April 8, 1861, for military reservations at Fort Steilacoom the post *garden* tract, comprising 126½ acres, has never been located with reference to the public surveys: hence the status of that tract cannot be stated.

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The post reserve of 1 mile square, situated in townships 19 and 20 north, range 2 east, Willamette meridian, was surveyed in 1871, and its location, as also the location of two donation claims covering part of the reserve, is shown on the inclosed tracing from a diagram received with the Surveyor-General's letter, November 20, 1871. That part of the post reserve in section 33 of township 20, range 2 east, not covered by donation claims, having been donated to Washington Territory by act of Congress approved April 15, 1874, and that part of the same reserve in section 5 of township 19 north, range 2 east, having been entered as a pre-emption claim, the only remaining parts of the post reserve which, from the records of this office, appear to be in the custody of the War Department, are as follows, viz: That part in section 4, township 19 north, and that part in section 32, township 20 north not covered by the donation claims of John Van Buskirk and T. M. Chambers.

With regard to the *fuel* reserve of 320? (160) acres, it has neither been connected with the public surveys nor laid down upon the township plats; but, from data on file in this office, its position has been approximately laid down on the inclosed tracing. It falls in section 4 of township 19 north, range 2 east, and that part in the west half of the section has been disposed of to pre-emption settlers, while that part in the east half of said section appears, from the records of this office, to be reclaimed. The letter from the War Department, with its inclosures, is herewith returned.

Very respectfully,

C. W. HOLCOMB,
Acting Commissioner.

Hon. C. SCHURZ,
Secretary of the Interior.

NOTE.—A plat having been furnished by the General Land Office October 5, 1881, showing the three reserves declared for Fort Steilacoom as delineated on the township plats, according to actual survey, a tracing thereof is substituted for all other plats referred to in these papers.

[First indorsement.]

ADJUTANT-GENERAL'S OFFICE,
Washington, February 23, 1881.

Respectfully referred to the Chief of Engineers for report as to the prospective need of the tracts still under control of the War Department, or any portion thereof, for defensive purposes; also for copy of the President's order and map, if on file in his office, showing the garden and fuel tracts within referred to.

To be returned.

By order of the Secretary of War.

R. C. DRUM,
Adjutant-General.

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS, UNITED STATES ARMY,
March 8, 1881.

Respectfully returned to the Adjutant-General United States Army, with a copy of the President's order and plats desired. The public lands at Fort Steilacoom are not required for the purposes of this department.

H. G. WRIGHT,
Chief of Engineers, Brig. and Bvt. Maj. Gen.

[Inclosure to second indorsement.]

DEPARTMENT OF THE INTERIOR,
Washington, April 5, 1861.

SIR: I have the honor to submit herewith the letter of the Secretary of War of the 12th ultimo, recommending the reservation of three tracts of land at Fort Steilacoom, Wash., according to surveys and plats made in January last by order of Col. Silas Casey, commanding the post, and now inclosed with other papers.

On reference of the Secretary's letter and accompanying papers to the Commissioner of the General Land Office, he has reported that the tracts proposed for military reserves are within the limits of a region of country claimed by the Puget Sound Agricultural Company, under the fourth article of the treaty of June 15, 1846, with Great Britain (9 Stat., p. 870).

Some correspondence between the Departments of State and the Interior in reference to this claim transpired in November last, and my predecessor decided to defer, at that time, any action in reference to extending the public surveys over the lands, designing to call the attention of Congress to the existing state of facts. In his annual report of

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November 30, 1860, pp. 5 and 6 (copy herewith), a brief exhibit of the claim, and of his view in respect to the same, will be found. It is believed, however, that no definite action upon the subject was taken by Congress.

I therefore respectfully recommend that you order the proposed military reservations to be made according to the inclosed surveys, subject to any valid claim to the lands existing under the treaty of June 15, 1846.

Very respectfully, your obedient servant,

CALEB B. SMITH,
Secretary.

The PRESIDENT.

EXECUTIVE OFFICE, *April* 8, 1861.

Let the reservations be made as within recommended by the Secretary of the Interior

ABRAHAM LINCOLN.

[Third indorsement.]

HEADQUARTERS OF THE ARMY,
Washington, March 10, 1881.

Respectfully returned to the Secretary of War, inviting atttention to preceding report of the Chief of Engineers that the public lands at Fort Steilacoom are not required for defensive purposes.

Attention is also invited to the copy of President's order and plats furnished by the Engineer Department, from which it will be seen that the reservation was declared subject to any valid claim arising under the fourth article of the treaty of June 15, 1846 and it is respectfully suggested that the papers be sent to the General Land Office for further information and report, with a view to determine whether the remaining tracts cannot be relinquished without Congressional action.

In February, 1872, the department and division commanders reported that the reservation would not be again required for military (garrison) purposes.

W. T. SHERMAN,
General.

WAR DEPARTMENT,
Washington, March 12, 1881.

SIR: I have the honor to return herewith the papers heretofore submitted to the Department of the Interior relative to the military reservation at Fort Steilacoom, Wash., together with a copy of the President's order declaring the reservation, and plats thereof as furnished from the office of the Chief of Engineers.

From the several indorsements borne upon the letter from Department of the Interior dated 15th ultimo, it will be perceived that the public lands at Fort Steilacoom are no longer required for defensive or garrison purposes, and that the reservation was declared subject to any valid claim arising under the fourth article of the treaty of June 15, 1846.

In view of these facts, and in accordance with the suggestion of the General of the Army, I ask that you will please inform the department whether the remaining tracts cannot be relinquished without Congressional action.

With reply please return inclosed papers.

Very respectfully, your obedient servant,

ROBERT T. LINCOLN,
Secretary of War.

To Hon. SECRETARY OF THE INTERIOR.

DEPARTMENT OF THE INTERIOR,
Washington, June 15, 1881.

SIR: Your letter of March 12 last, inclosing maps and papers (returned herewith as requested) concerning the military reservation at Fort Steilacoom, Wash., and asking whether certain tracts in the reservation can be relinquished without Congressional action, was received and referred to the Commissioner of the General Land Office. I have the honor to inclose herewith copy of his report on the subject, under date of the 13th instant. He is of the opinion that there is no authority under existing laws for the disposal of said tracts by his office in case they should be relinquished by your department.

Very respectfully,

S. J. KIRKWOOD,
Secretary.

To Hon. SECRETARY OF WAR.

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DEPARTMENT OF THE INTERIOR, GENERAL LAND OFFICE,
Washington, June 13, 1881.

SIR: I have the honor to acknowledge the receipt, by reference from the department for report, of a letter from the honorable the Secretary of War, dated March 12, 1881, inclosing maps and papers referring to the military reservations at Fort Steilacoom, Wash., and asking if those portions of said reservations not already disposed of may not be relinquished to the Interior Department without Congressional action, such tracts being reported as no longer needed for defensive or garrison purposes. Reference is also made to the fact that said reservations were declared subject to any valid claim arising under the fourth article of the treaty of June 15, 1846.

In reply I have the honor to state that of the three tracts of land declared by the President on April 8, 1861, for military reservations at Fort Steilacoom, the post garden tract, comprising 126.25 acres, has been surveyed and connected with the lines of the public-land surveys by Deputy Surveyor B. S. B. Henry, under especial instructions from this office, dated March 22, 1881, and instructions from the United States surveyor-general, dated April 19, 1881. From the return of surveys made it appears that an area of 13.80 acres is covered by donation claim of J. Faucet, 27.83 by donation claim of Peter Smith, and the remaining 84.62 acres are absorbed by pre-emption filing of Peter J. Smith, thus covering the entire reservation of 126.25 acres.

The fuel reserve, comprising 160 acres, has also been connected with the public-land surveys, and there remains to the control of the War Department an area of 104.48 acres; 55.52 acres being covered by the pre-emption claims of H. D. Montgomery and Charles Clark.

The post reserve of one mile square, situated in townships 19 and 20 north, range 2 east, Willamette meridian, is covered in part by fractions of donation claims of T. M. Chambers and J. Van Buskirk; the remaining area of the reserve in section 33, not covered by donation claims, having been donated to Washington Territory by act of Congress approved April 15, 1874; that portion of the reserve in section 5, township 19 north, range 2 east, being entered as a pre-emption claim, there remains to the control of the War Department an area of 101.06 acres, and making an aggregate area of 205.54 acres.

I have also the honor to report that there is not in this office any record of a claim under the treaty of June 15, 1846, or under any act of Congress, to those portions of the post and fuel reserves at Fort Steilacoom described as vacant, and hence there is no authority under existing laws for the disposal of said tracts by this office in case they should be relinquished by the War Department.

The letter of the honorable the Secretary of War, and the accompanying papers, are herewith returned.

I have the honor to be, very respectfully, your obedient servant,

C. W. HOLCOMB,
Acting Commissioner.

Hon. S. J. KIRKWOOD,
Secretary of the Interior.

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, August 23, 1881.

SIR: Referring to reports from your office dated February 14 and June 13, 1881, in the matter of the military reservations at Fort Steilacoom, Wash., based upon letters of inquiry from the Secretary of War, I have the honor to request that, if practicable, you will cause this office to be furnished with a plat showing the relative location of the post, fuel, and garden reserves, according to the Land-Office surveys, also indicating the portions that have been disposed of and those remaining under military control, as noted in said reports.

I am, sir, very respectfully, your obedient servant,

R. C. DRUM,
Adjutant-General.

The COMMISSIONER OF THE GENERAL LAND OFFICE.

DEPARTMENT OF THE INTERIOR, GENERAL LAND OFFICE,
Washington, D. C., October 5, 1881.

SIR: I have the honor to acknowledge the receipt of your letter, dated the 23d August last, requesting to be furnished with a plat showing the relative location of the post, fuel, and garden reserves, at Fort Steilacoom, Wash., and indicating the portions of said reserves that have been disposed of and those remaining under military control, as noted in reports from this office to the department February 14 and June 13, 1881.

In reply I transmit, herewith inclosed, a tracing from a portion of the plats of townships 19 and 20 north, range 2 east, and township 19 north, range 3 east, Willamette meridian, Washington Territory, showing the location of said reserves, and indicating by

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areas expressed in black ink the portions undisposed of and remaining under the control of the War Department.

Upon a recalculation of areas of the tracts not sold or otherwise disposed of, it is found that they vary slightly from those mentioned in the reports referred to, as follows: The post reservation containing 99.78 acres, instead of 101.06 acres; the fuel reservation containing 104.59 acres, instead of 104.48 acres; and the post garden reserve, exclusive of that part embraced in donation claims and patented, containing an area of 84.64 acres, instead of 84.62 acres as reported. The latter tract of 84.64 acres, although covered by a declaratory statement filed by a pre-emptor prior to the date when the reserve was surveyed and represented upon the township plat, was not filed upon until long after the reservation was declared; hence it would still remain under control of the War Department until relinquished by authority of an act of Congress.

Very respectfully, your obedient servant,

N. C. McFARLAND,
Commissioner.

General R. C. DRUM,
Adjutant-General, U. S. A., Washington, D. C.

BRIEF IN THE MATTER OF "TIMBER RESERVATION" YEAR WHIPPLE BARRACKS, ARIZ.

Under date of June 20, 1873, the President of the United States, by executive order, declared a military timber reservation six miles south of the post of "Fort Whipple," now Whipple Barracks, Ariz., with area and boundaries as announced in the following order:

[General Orders No. 26.]

HEADQUARTERS DEPARTMENT OF ARIZONA,
Prescott, August 5, 1873.

The following-described lands having been set apart by the President and designated as a timber reservation, Fort Whipple, Ariz., the metes and bounds are announced for the information of all concerned:

Commencing at the northwest corner of the west half of the northeast quarter, section 34, of township 13 north, range 2 west; thence eastwardly 60 chains to a stone monument; thence south 80 chains to a stone monument on township line between townships 12 and 13 north, range 2 west; thence westwardly along said township line 120 chains; thence north 40 chains to a point on the southern boundary of present timber reserve; thence eastwardly along said boundary 60 chains to southeast corner of said reserve; thence north 40 chains to point of beginning, the whole embracing 720 acres.

By command of Brevet Major-General Crook.

A. H. NICKERSON,
Captain Twenty-third Infantry, A. D. C., and A. A. A. General.

This action was in accordance with recommendation of department and division commanders, and to enable the Quartermaster's Department to procure lumber required for construction and completion of certain buildings at posts in that department at a reasonable rate.

It being understood at department headquarters in June, 1879, that this timber reservation had been *relinquished* under act of Congress approved June 22, 1874, and War Department letters of December 7, 1874, and October 21, 1875, to the Secretary of the Interior, relinquishing portions of the "Fort Whipple military reservation" not longer required for military purposes (said reservation having been *relocated* by executive order dated October 19, 1875, and the new boundaries announced in General Order No. 34, of 1875, from department headquarters), while such was *not* the understanding of this department, inquiry was made by War Department letter of August 1, 1879, addressed to the Commissioner of the General Land Office, whether the "timber reserve" was held to have been relinquished as above; also, whether, if not so regarded, it could *then* be relinquished, if deemed advisable, without additional legislation.

In reply, the acting Commissioner stated that it *had not* been regarded by his office as relinquished by the Secretary of War under the act in question; but inasmuch as it is not regarded as a military site, he suggested that, if the government had no further use for it, the President's order might be obtained *canceling* the order of June 20, 1873 (creating the reserve), and then the land might be disposed of under existing laws.

The papers having been returned to the division commander for report as to whether or not the timber reserve is still required for military purposes, to the end that if not re-

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quired proper steps might be taken for its relinquishment, were returned to this office, with report of the department chief quartermaster, that said reserve is no longer required, and that from what he can learn the Government has not for several years past used any timber from the reserve for building or other purposes; also with proceedings of a board of officers, convened by orders of July 5, 1881, from department headquarters (at request of the division commander), to determine and report the quantity of timber thereon suitable for lumber and fuel, and as to whether or not it should be retained by the Government.

The report of the board is as follows:

"The board has visited the late site of the Government saw-mill and its vicinity. The little timber there remaining is in almost inaccessible places, and for that cause of little or no market value

"Since the working of the Government saw-mill was discontinued the timber on the reservation appears to have been cut by private parties, who have since moved their mill, on account of the exhaustion of that tract.

"The board has been unable to form an estimate of the quantity, as the trees are irregularly scattered, and those fit for timber very few.

"What little growth remains might be available for fuel, but the distance of the reservation (about six miles) and the plentiful supply of fuel nearer makes it unlikely that the rate of future fuel contracts could be affected by the retention of the reservation.

"The board therefore recommends relinquishment."

The proceedings of the board bear the approval of the department commander.

Upon reference, the Quartermaster-General concurs, and recommends that the reservation be abandoned to the Interior Department.

It has long been held by the War Department that "once properly declared by the President, military reservations cannot be relinquished or otherwise disposed of *without the sanction of* Congress." (*Vide* Wilcox *vs.* Jackson, 13 Pet., 513; 10 Op., 365.)

And in an opinion of Attorney-General MacVeagh, dated as recent as July 20, 1881, in the case of the "hay reservation" at Fort Fetterman, Wyo., in reply to the following question of the Secretary of War:

"When a reservation of public lands is made by the President for military purposes, and at some subsequent period such lands become no longer necessary for the purposes for which they were reserved, *may the President by a revocation of his order* restore the lands to the public domain?" The Attorney-General was of opinion that the question propounded must be answered *in the negative*, and that "in the case presented by your question I am accordingly of opinion (concurring in the views of my predecessors above referred to) that the lands cannot be restored to the public domain *by the Executive* without authority from Congress."

From the foregoing it would appear that the suggestion of the acting Commissioner of the General Land Office, that the executive order of June 20, 1873, be canceled by the President, is impracticable, and that the disposition of the timber reservation near Whipple Barracks, Ariz., is a question for the action of Congress.

Respectfully submitted.

C. MCKEEVER,
Assistant Adjutant-General, in charge.

ADJUTANT-GENERAL'S OFFICE,
Washington, September 15, 1881.

WAR DEPARTMENT,
Washington, September 28, 1881.

SIR: Referring to previous correspondence respecting the relinquishment of a portion of the Fort Whipple military reservation in Arizona under the provisions of an act of Congress approved June 22, 1874 (18 Stat., p. 201), I have the honor to state that the subject has received further consideration with especial reference to the necessity for the further retention of said reservation for military purposes.

Observing that in your letter of August 11, 1879, you state, in reply to inquiry from this Department, that the timber reservation near Prescott, set apart for government use by an executive order of a different date from that declaring Fort Whipple, was nowhere mentioned as a part of Fort Whipple Reservation, and therefore has not been regarded by your office as relinquished by the Secretary of War under the above-mentioned act of Congress, and suggest that, inasmuch as the said timber tract is not regarded as a military site, the President's order might be obtained canceling the order of June 20, 1873, declaring said timber reservation, and that the land might then be disposed of under existing laws, I beg to state that whilst it appears that the reservation in question is no longer needed for military purposes, the decision of the Supreme Court in the case of Wilcox *vs.* Jackson (13 Pet., 513; 10 Op., 355), and the opinion of the honorable the Attorney-General of July 20, 1881, in the case of the "hay reservation" at Fort Fetterman,

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Wyo., are regarded by this department as conclusively establishing the fact that the timber reservation of Fort Whipple, having been declared by the President, cannot be restored to the public domain by the executive without authority from Congress.

Very respectfully,

ROBERT T. LINCOLN,
Secretary of War.

The COMMISSIONER OF THE GENERAL LAND OFFICE.

HEADQUARTERS OF THE ARMY, ADJUTANT-GENERAL'S OFFICE,
Washington, December 18, 1880.

SIR: I have the honor to inform you it appears from the records that under date of 6th April, 1859, the President of the United States declared and set apart for military purposes a tract of land embracing 100 acres, situated on Sulphur Creek, Utah Territory, about 26 miles from Fort Bridger, said tract now being included in Uinta County in the Territory of Wyoming, and also embracing the "coal mines" on Sulphur Creek.

The General of the Army desires you to report to this office, for the information of the Secretary of War, whether or not said lands are now occupied or further desired for military purposes, and whether there are any government buildings or improvements thereon, to the end that if not so required they may be reported to Congress for relinquishment or sale.

An early reply is desired.

I am, sir, very respectfully, your obedient servant,

CHAUNCEY McKEEVER,
Assistant Adjutant-General.

The COMMANDING GENERAL, DEPARTMENT OF THE PLATTE.
(Through Headquarters Military Division of the Missouri.)

[Indorsements.]

HEADQUARTERS MILITARY DIVISION OF THE MISSOURI,
Chicago, December 21, 1880.

Respectfully transmitted to the commanding general, Department of the Platte.
By command of Lieutenant-General Sheridan.

WM. D. WHIPPLE,
Assistant Adjutant-General.

To the chief engineers officer—remark.

HEADQUARTERS DEPARTMENT OF THE PLATTE,
Engineer Office, Fort Omaha, Nebr., January 26, 1881.

Respectfully returned to the adjutant-general of the department with a tracing from a copy of the official township plat, secured from the office of the surveyor-general of Wyoming, showing the location of the reservation as given by the public land surveys, and with reference to Fort Bridger.

The reservation contains $99\frac{1}{100}$ acres, is 24 miles south, 61° 30′ west, from Fort Bridger, and only one-half mile from the Union Pacific Railway. It was reserved upon the recommendation of Maj. (and Bvt. Lieut. Col.) E. R. S. Canby, Tenth Infantry, commanding Fort Bridger, to embrace "the coal mines on Sulphur Creek."

On the plat of the original military survey of the tract, two coal beds are indicated within and near its west boundary.

The field notes of the public land survey mention prospecting shafts and indications, and outcroppings of coal in its vicinity, also that several coal banks are opened in the township (14 north range, 119 west), and that it is said that oil can be procured there.

I would respectfully invite attention to the fact that the reservation lies in a section (odd numbered) belonging to the Union Pacific Railway Company, and that its relinquishment as a military reservation may perhaps result in transferring it to that company.

W. S. STANTON,
Captain of Engineers, Chief Engineer of Department.

HEADQUARTERS DEPARTMENT OF THE PLATTE,
ASSISTANT ADJUTANT-GENERAL'S OFFICE,
Fort Omaha, Nebr., January 31, 1881.

Respectfully referred to the commanding officer, Fort Bridger, Wyo., for remark.
Please return.
By command of Brigadier-General Crook.

R. WILLIAMS,
Assistant Adjutant-General.

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HEADQUARTERS, FORT BRIDGER, WYO.,
February 8, 1881.

Respectfully returned.

The reservation is not now occupied or desired for military purposes, and the records of this office do not show that there are, or have been, any government buildings or improvements thereon.

WILLIAM H. BISBEE,
Captain Fourth Infantry, Commanding Post.

HEADQUARTERS DEPARTMENT OF THE PLATTE,
ASSISTANT ADJUTANT-GENERAL'S OFFICE,
Fort Omaha, Nebr., February 14, 1881.

Respectfully referred to the chief quartermaster of the department, for remark as to whether the coal mines on the land in question can be made useful to the government.

By command of Brigadier-General Crook.

R. WILLIAMS,
Assistant-Adjutant General.

CHIEF QUARTERMASTER'S OFFICE,
DEPARTMENT OF THE PLATTE,
Fort Omaha, Nebr., February 15, 1881.

Respectfully returned to the adjutant-general, Department of the Platte.

Considering the location of the reservation, it would not in my opinion be at all advantageous for the Quartermaster's Department to undertake to work any coal mines which may be on the property.

M. I. LUDINGTON,
Chief Quartermaster.

HEADQUARTERS DEPARTMENT OF THE PLATTE,
Fort Omaha, Nebr., February 23, 1881.

Respectfully returned through the office of the assistant adjutant-general, United States Army, Headquarters Military Division of the Missouri, to the Adjutant-General of the Army, Washington, D. C., inviting attention to the indorsements of the commanding officer, Fort Bridger, Wyo., and the chief quartermaster of the department, fifth and seventh, hereon, which are concurred in.

GEORGE CROOK,
Brigadier-General Commanding.

HEADQUARTERS MILITARY DIVISION OF THE MISSOURI,
Chicago, February 26, 1881.

Respectfully forwarded to the Adjutant-General of the Army.

P. H. SHERIDAN,
Lieutenant-General Commanding.

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, March 3, 1881.

Respectfully referred to the Quartermaster-General for an expression of his views.

To be returned.

By order of the Secretary of War.

C. M. MCKEEVER,
Assistant-Adjutant General.

QUARTERMASTER-GENERAL'S OFFICE,
Washington, March 11, 1881.

Respectfully returned to the honorable Secretary of War.

I recommend that this coal reservation be restored to the public lands under control of Interior Department—Land Office.

M. C. MEIGS,
Quartermaster-General, Brt. Maj. Gen., U. S. A.

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[Extract 6419, A. G. O., 1881.]

HEADQUARTERS MILITARY DIVISION OF THE MISSOURI,
Chicago, November 28, 1881.

SIR: I have the honor to make known the following views and requests to the General of the Army:

* * * * * * *

I propose to ask the Secretary of War to abandon Forts Wallace and Dodge in the spring. They are of no earthly use now. The supplies for Forts Supply and Elliot go via Dodge City, so that Fort Dodge is not now even on a line of supply and Wallace is valueless.

* * * * * * *

Trusting that my views as herein stated will meet with the approbation of the General of the Army and Secretary of War,

I remain, very respectfully, your obedient servant,

P. H. SHERIDAN,
Lieutenant-General Commanding.

ADJUTANT-GENERAL OF THE ARMY,
Washington, D. C.

[First indorsement.]

HEADQUARTERS OF THE ARMY,
Washington, December 1, 1881.

Respectfully submitted to the honorable Secretary of War.

This letter illustrates what I endeavored to demonstrate in my annual report of November 3.

It is only twelve years since Forts Dodge and Wallace were in the heart of the buffalo and Indian region. They have fulfilled their work and must be abandoned. Each year presents a new problem, and it is the special office of the division commander to study the best means of defense so as to protect new interests.

* * * * * * *

W. T. SHERMAN,
General.

[Extract from indorsements on 5954, A. G. O., 1881.]

HEADQUARTERS MILITARY DIVISION OF THE MISSOURI,
Chicago, November 30, 1881.

Respectfully returned to the General of the Army.

* * * * * * *

I wish, however, to recommend the abandonment of Forts Dodge and Wallace. They have fulfilled their mission and are of no earthly use. In the early spring I will recommend the abandonment of these posts. Fort Lyon, also, is of no use, but it is as yet in a wild cow-boy country, and has good quarters for troops, and should last some time longer.

P. H. SHERIDAN,
Lieutenant-General Commanding.

HEADQUARTERS OF THE ARMY,
Washington, December 6, 1881.

Respectfully submitted to the honorable Secretary of War, for his information, recommending that unless Congress pass a general law for the disposition of old posts, as recommended in my annual report, that authority be asked for the sale of Forts Dodge, Wallace, and Lyon.

W. T. SHERMAN,
General.

[General Orders, No. 25.]

HEADQUARTERS DEPARTMENT OF THE MISSOURI,
Fort Leavenworth, Kansas, August 13, 1868.

General orders, No. 18, C. S., from these headquarters, is hereby amended to read as follows:

I. Subject to the approval of the Secretary of War, the military reservation at Fort Lyon, C. T., is designated as follows:

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The initial point is one mile sixteen hundred and ninety-two yards and one foot north 11° west from the southwest corner of the commissary warehouse; thence the boundary line of the reserve runs west 21° south for two miles five hundred yards; thence west for two miles three hundred yards; thence south for four hundred and sixty-six yards and two feet, to a stone on the north bank of the Arkansas River; thence along the north bank of said river in an easterly direction, and including all islands in said river to a stone at the point of Stein's Bluff (which stone bears east 26° north from the commissary warehouse, and being distant therefrom about two miles and thirteen hundred and ten yards); thence the boundary line runs north thirteen hundred and twenty yards, and thence west two miles thirteen hundred and twenty yards to the initial point.

The points of the compass mentioned are true points, not magnetic.

The variation of the compass was 14° east.

The reservation contains nine square miles one hundred and fourteen acres and four thousand and eighty square yards. Each corner of the reserve is marked by a cut stone (gray sandstone), having U. S. Mil. Res. chiseled on one side. Every half mile along the boundary line is marked by a wooden stake, having U. S. Mil. Res. painted on it.

By command of Major-General Sheridan:

CHAUNCEY McKEEVER,
Assistant Adjutant-General.

[General Orders, No. 17.]

HEADQUARTERS DEPARTMENT OF THE MISSOURI,
Fort Leavenworth, Kansas, May 29, 1868.

Subject to the approved of the Secretary of War, the military reservation at Fort Dodge is designated as follows:

The initial point is three miles nine hundred and ninety-three yards east 23° 47′ south of the flag staff, thence the boundary of the reservation runs fourteen miles north, thence four miles and one-half west, thence one mile south 26° west, thence ten miles south, thence three miles west, thence four hundred and nineteen yards south to the north bank of the Arkansas River, thence along the north bank of said river in a southeasterly direction to the initial point.

The points of the compass mentioned are true points, not magnetic.

The variation of the compass in March, 1868, when the survey was made was 13° east.

At each corner of the reservation a cut stone (gray sandstone) is sunk, having "U. S. Mil. Res." chiseled on one side. Every half mile along the boundary line there is a wooden stake painted "U. S. Mil. Res." The stone at the southeast corner is set back fifteen feet, with a stake at the edge of the bank.

The reservation contains 67 square miles, 581 acres, and 1,680 square yards, more or less.

By command of Major-General Sheridan:

CHAUNCEY McKEEVER,
Assistant Adjutant-General.

LAWS OF THE UNITED STATES PASSED AT THE THIRD SESSION OF THE FORTY-SIXTH CONGRESS.

[PUBLIC—No. 1.]

AN ACT to authorize the Secretary of the Interior to dispose of a part of the Fort Dodge military reservation to actual settlers, under the provisions of the homestead laws, and for other purposes.

Whereas, that portion of the Fort Dodge military reservation hereinafter described is no longer needed for military purposes: Therefore,

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That it shall be the duty of the Secretary of the Interior to cause all that portion of the Fort Dodge military reservation, in the State of Kansas, being and lying north of land owned and occupied by the Atchison, Topeka and Santa Fé Railroad Company for right of way for its railroad; and to cause the same to be surveyed, sectionized, and subdivided as other public lands, and after said survey to offer said lands to actual settlers only, under and in accordance with the homestead laws of the United States: *Provided*, That the said Atchison, Topeka and Santa Fé Railroad Company shall have the right to purchase such portion of said reservation as it may need for its use adjoining that now owned by it, not exceeding one hundred and sixty acres, by paying

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therefor the price at which the same may be appraised, under the direction of the Secretary of the Interior.

SAM. J. RANDALL,
Speaker of the House of Representatives.
W. A. WHEELER,
Vice-President of the United States and President of the Senate.

Approved, December 15, 1880.

R. B. HAYES.

[General Orders, No. 24.]

HEADQUARTERS DEPARTMENT OF THE MISSOURI,
Fort Leavenworth, Kansas, August 8, 1868.

General Orders, No. 126, 1st series of 167, from these headquarters is hereby amended to read as follows:

I. Subject to the approval of the Secretary of War, the military reservation at Fort Wallace is designated as follows:

The initial point is one mile north of the south end of the quartermaster's storehouse, thence the boundary line of the reserve runs five miles east, thence two miles south, thence seven miles west, thence two miles north, and thence two miles east to the initial point.

The points of the compass mentioned are true points, not magnetic.

The variation of the compass in June, 1867, when the survey was made, was 13° 52′ east.

The reservation contains fourteen square miles.

* * * * * * * * * *

By command of Major-General Sheridan:

CHAUNCEY McKEEVER,
Assistant Adjutant-General.

[H. Ex. Doc. No. 90, Forty-sixth Congress, third session.]

Letter from the Secretary of War, relative to the disposition of abandoned military reservations.

FEBRUARY 7, 1881.—Referred to the Committee on Military Affairs.
FEBRUARY 17, 1881.—Ordered to be printed, with the accompanying papers.

WAR DEPARTMENT,
Washington City, February 7, 1881.

SIR: Referring to my letter of the 4th instant, transmitting a list of useless military reservations, which was laid before the House and referred to your committee on the 5th instant, I beg to request that the letter and accompanying documents be printed. Such documents have as a rule been printed heretofore and are valuable for reference. This list was carefully prepared. It contains much valuable information, and took considerable time to prepare. It should, therefore, be printed for the use of this department.

Very respectfully, your obedient servant,

ALEX. RAMSEY,
Secretary of War.

Hon. W. A. J. SPARKS,
Chairman Committee on Military Affairs,
House of Representatives.

WAR DEPARTMENT,
Washington City, February 4, 1881.

SIR: I have the honor to transmit herewith a list of military reservations reported as no longer needed for military purposes, and still in the custody of the War Department.

Special attention is invited to this list, which embraces twenty-four different military sites, twenty-two of which have heretofore been reported to Congress with request for authority to dispose of the same, as the act of June 12, 1858 (11 Stats., p. 336, ch. 156), provides that "said lands shall not be subject to sale or pre-emption under any of the laws of the United States."

The act of March 3, 1819 (3 Stats., p. 520, ch. 88), authorized the Secretary of War, under the direction of the President, to sell military sites which *had* become useless for military purposes, and the act of March 3, 1857 (11 Stats., p. 203, ch. 106), extended

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this authority to *all* military sites which *are or may become* useless. The act of June 12, 1858, above referred to, however, repealed all existing laws which authorized the sale of useless military sites (see abstract of laws on this subject hereto attached), and since then sites reported by the military authorities as no longer of any use for military purposes have been reported to Congress with request for special legislation. But from the time such a site is so reported until an act of Congress is passed authorizing its disposition, the department is of necessity compelled to provide for its care and preservation, and as several years generally elapse before such an act is passed the care of such useless reservations is a considerable tax upon the reduced appropriations of the department.

The retention of such reservations is also objectionable on other grounds, as will be seen from the following extract from a letter of the Commissioner of the General Land Office, dated September 11, 1877, to the honorable Secretary of the Interior. He says:

"Applications are frequently made to this office, by persons who are settlers in good faith, for permission to enter lands which at some former period were reserved for military purposes by the President, or were occupied by the military authorities, but are not now used for military purposes.

"The law of June 12, 1858 (vol. 11, p. 336), forbids the sale or disposal of military sites which are or may become useless for military purposes, except those in Florida.

"This prohibition of the sale of useless military reservations is believed by this office to be adverse to the public interests, inasmuch as it prevents the acquisition of title to lands which the government does not longer need to retain."

In view of the foregoing, I have the honor to respectfully request that authority be granted during the present session of Congress to dispose of the reservations mentioned in the inclosed list, and that a general law be passed authorizing the Secretary of War to transfer such military sites as are or may hereafter become useless for military purposes to the custody of the Secretary of the Interior, for disposition under the general land laws, or such other disposition as may be deemed for the best interests of the United States. The buildings, if any, on such sites to be disposed as the Secretary of War may determine, either by transfer in whole or in part to other posts where needed, by separate sale, or transfer to the Secretary of the Interior for sale with the land.

In this connection I would invite attention to my letters of the 23d of April, 1880, and January 6, 1881, reporting the necessity for the establishment in the office of the Secretary of War of a land-title division, which shall have charge of all matters pertaining to lands in the custody of the War Department. The necessity for such a division becomes more and more urgent every year, and I would earnestly request that action be taken during the present Congress which will authorize the establishment of such a division, and the necessary appropriation be made therefor.

In view of the importance of this subject, I beg to request that this letter and the accompanying documents be printed.

Very respectfully, your obedient servant,

ALEX. RAMSEY,
Secretary of War.

The SPEAKER *of the House of Representatives.*

Law in regard to sale of military sites.

AN ACT authorizing the sale of certain military sites.

Be it enacted, &c., That the Secretary of War be, and he is hereby, authorized, under the direction of the President of the United States, to cause to be sold such military sites belonging to the United States as may have been found or become useless for military purposes. And the Secretary of War is hereby authorized, on the payment of the consideration agreed for into the Treasury of the United States, to make, execute, and deliver all needful instruments, conveying and transferring the same in fee; and the jurisdiction which had been specially ceded for military purposes to the United States by a State over such site or sites shall thereafter cease.

Approved March 3, 1819.—(3 Stat., p. 520, ch. 88.)

Act April 28, 1828.

SECTION 1. In all cases where lands have been or may hereafter be conveyed to, or for, the United States, for forts, arsenals, dock-yards, light-houses, or any like purpose, or in payment of debts due the United States, which shall not be used, or necessary for the purposes for which they were purchased, or other unauthorized purpose, it shall be lawful for the President of the United States to cause the same to be sold for the best price to be obtained, and to convey the same to the purchaser by grant or otherwise.—(4 Stat., p. 264.)

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Act March 3, 1857, 11 Stat., p. 203, ch. 106.

SEC. 4. That the provisions of the act approved March 3, 1819, entitled "An act authorizing the sale of certain military sites," be, and they are hereby, extended to all military sites, or to such parts thereof which are or may become useless for military purposes: *Provided, nevertheless,* That nothing in this act, nor in the act above mentioned, shall be so construed as to impair in any wise the right of the State within which any such site or reservation may be situated to impose taxes on the same, in like manner as upon other lands or property owned by individuals within the State after such sale.

Act June 11, 1858, 11 Stat., p. 336, ch. 156.

SEC. 6. That all the existing laws, or parts of laws, which authorized the sale of military sites which are or may become useless for military purposes be and the same are hereby repealed, and said lands shall not be subject to sale or pre-emption under any of the laws of the United States: *Provided, further,* That the provisions of the act of August 18, 1856,* relative to certain reservations in the State of Florida, shall continue in force.

[Senate Ex. Doc. No. 158, Forty-sixth Congress, second session.]

Letter from the Secretary of War, transmitting a report relative to the public lands, forts, arsenals, &c., in the custody of that department, and recommending the creating in that office a division designated as "Land Title Division," and provision made therefor.

APRIL 26, 1880.—Laid on the table and ordered to be printed.

WAR DEPARTMENT,
Washington City, April 23, 1880.

The Secretary of War has the honor to transmit to the United States Senate a copy of a report prepared in compliance with his instructions by the chief of the correspondence division of this department, relative to the subject of public lands, forts, arsenals, &c., in the custody of the War Department.

This report presents succinctly and with clearness the laws, decisions, and regulations governing the subject, and points to the inconvenience, delay, and error which, under the existing regulations, are liable to occur in the determining of questions that are constantly arising in regard to titles and other matters connected with these lands, forts, &c.

When it is considered that the lands occupied for military purposes, including forts, arsenals, armories, &c., and in the custody of the War Department, represent an estimated value of about $200,000,000, it becomes clearly obvious that the public interests require that the transfer deeds and all other papers affecting the question of title, which are now scattered through several of the department bureau offices, should be collected, recorded, and filed, for safe and permanent preservation, in the office of the Secretary of War, and that there should be provided a system of record, exhibiting in detail all known facts connected with each piece or parcel of property, and of the action had by the department, from time to time, in relation thereto, in order that all questions, as they arise, may be promptly and intelligently determined.

The Secretary of War, in the absence of legislation, is unable to inaugurate the desired measures, and, viewing the subject as one involving considerations of great importance, respectfully and urgently recommends that legislation be had during the present session of Congress creating in this office a division to be designated and known as the "Land Title Division," and that provision be made for employés therein as follows, namely:

One chief of division, at an annual salary of	$2,500
One assistant chief of division, at an annual salary of	2,000
One clerk of class four, at an annual salary of	1,800
One draughtsman, at an annual salary of	1,800
One clerk of class three, at an annual salary of	1,600
One clerk of class one, at an annual salary of	1,200
One assistant messenger, at an annual salary of	[illegible]

ALEX. RAMSEY,
Secretary of War.

The PRESIDENT
of the United States Senate.

*Section 1, act August 18, 1856 (11 Stat., p. 87, ch. 129), provides "That all public lands heretofore reserved for military purposes in the State of Florida, which said lands in the opinion of the Secretary of War, are no longer useful or desired for such purpose or so much thereof as said Secretary may designate, shall be and are hereby placed under the control of the General Land Office, to be disposed of and sold in the same manner as under the same regulations as other public lands of said United States: *Provided*, That said lands shall not be so placed under the control of said General Land Office until the opinion of the Secretary of War, giving his consent, communicated to the Secretary of the Interior in writing, shall be filed and recorded."

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WAR DEPARTMENT,
Correspondence Division, April 19, 1880.

Mr. SECRETARY: In compliance with your instructions, I have the honor to report on the subject of the real estate in the custody of the War Department.

The law, decisions, and Army Regulations on this subject are, in part, as follows:

LAW AND DECISIONS.

"No land shall be purchased on account of the United States, except under a law authorizing such purchase." (*Revised Statutes, section* 3736; *also paragraph* 1058, *Army Regulations, edition of* 1863.)

"No public money shall be expended upon any site or land purchased by the United States for the purpose of erecting thereon any armory, arsenal, fort, fortification, navy-yard, custom-house, light-house, or other public building, of any kind whatever, until the written opinion of the Attorney-General shall be had in favor of the validity of the title, nor until the consent of the legislature of the State in which the land or site may be to such purchase has been given," &c. (*Revised Statutes, section* 355; *paragraph* 1059, *Army Regulations*, 1863, *almost identical*).

"From an early period of the history of the government it has been the practice for the President to order, from time to time, as the exigencies of the public service required, parcels of land belonging to the United States to be reserved from sale and set apart for public uses, and the authority of the President is recognized in numerous acts of Congress." (*Grisar* v. *McDowell*, 6 *Wall.*, 381).

Reservations for forts, &c., in Oregon (including Washington and Idaho Territories), limited to 640 acres. (*Acts Sept.* 27, 1850, *section* 14, 9 *Statutes*, 500; *and Feb.* 14, 1853, *section* 9, 10 *Statutes*, 159).

Once properly declared by the President, military reservations cannot be relinquished or otherwise disposed of without the sanction of Congress. (*Wilcox* v. *Jackson*, 13 *Peters*, 513; 10 *Opin.*, 365).

Exception: Military reservations in Florida set apart prior to August 18, 1856, when no longer required, can be relinquished by the Secretary of War to the Interior Department for disposition by the General Land Office. (*Act June* 12, 1858, *ch.* 156, *section* 6, 11 *Statutes*, 336.)

ARMY REGULATIONS.

Paragraph 1061. "Complete title papers, with full and exact maps, plans, and drawings of the public lands purchased, appropriated, or designed for permanent military fortifications, will be collected, recorded, and filed in the Bureau of the Corps of Engineers; of the public lands appropriated or designated for armories, arsenals, and ordnance depots, will be collected, ordered, and filed in the Ordnance Bureau; of all other land belonging to the United States, and under the charge of the War Department, for barracks, posts, cantonments, or other military uses, will be collected, recorded, and filed in the office of the Quartermaster-General of the Army."

Paragraph 1062. "A copy of the survey of the land at each post, fort, arsenal, and depot, furnished from the proper bureau, will be carefully preserved in the office of the commanding officer."

RECAPITULATION.

From the foregoing it will be seen that lands are acquired by the War Department either by purchase or reservation of public land. When acquired they can be disposed of only with the consent of Congress, except lands in Florida set apart prior to August 18, 1856.

That the quantity of land that may be reserved for military sites is unlimited, except in the State of Oregon and in Washington and Idaho Territories.

The *regulations* require title papers, maps, plans, and drawings to be collected, recorded, and filed, as follows:

For permanent military fortifications, bureau of the Chief of Engineers.

For armories, arsenals, and ordnance depots, in the Ordnance Bureau.

All other lands for barracks, posts, cantonments, or other military uses, in the office of the Quartermaster-General.

Copy of the survey in the office of the commanding officer.

The following statement shows the number of military posts, &c., at various periods of the government:

Number of posts in 1802	27	See letter of Secretary Calhoun, of December 11, 1818.
Number of posts in 1818	73	

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Number of posts in 1860	154	Memoranda, page 480, Burnside report on the reorganization of the Army.
Number of posts in 1878	212	
Number of posts occupied by troops in 1860	77	
Number of posts occupied by troops in 1878	146	
Number of arsenals in 1860	23	
Number of arsenals in 1878	18	
Number of posts occupied by troops in 1880	140	Army Register for 1880.
Number of posts in charge of ordnance sergeant in 1880	47	
Number of arsenals in 1880	18	
Number of recruiting depots in 1880	3	
Number of engineer depots in 1880	1	
Number of national cemeteries in 1880	78	
Total posts, &c	287	

This statement does not include a number of reservations for fortifications, a number of "abandoned" military posts now in charge of agents of the Quartermaster's Department, also some property which has probably been lost sight of, as in the accompanying list of real estate purchased by the United States since July 4, 1776, and in the custody of the War Department on the 14th of February, 1825 (House Ex. Doc. No. 92, 19th Congress, 1st session), there are 198 pieces of property mentioned.

It is almost impossible to form an estimate of the value of this property. It probably aggregates more than $200,000,000. General Benét in a statement dated April 5, 1872, reported the value of arsenal and armories in 1821 as $2,420,084, and the value of arsenals and armories on June 30, 1871, as $11,301,621.78; and this includes but one-sixteenth of the posts reported in the present Army Register, without considering abandoned military posts and other real property.

There are a number of military reservations which are of no further use for military purposes, and every year the number increases.

It is the custom of the Secretary of War to report such cases to Congress as soon as they are brought to his notice, and ask for authority to transfer the reservations to the custody of the Secretary of the Interior for sale or disposition under the general land laws. As a rule, several years elapse before such authority is granted, and in the mean time trespassers come upon the reserves as soon as the troops leave, and when ejected they appeal to the department to reinstate them in possession of land to which oftentimes they have no shadow of claim.

These claims are a source of constant annoyance, and in addition there is the expense of an agent to take care of each "abandoned" reservation. It would be a benefit to the public service if a general law were passed authorizing the Secretary of War to dispose of useless military reservations, either by sale or by transfer to the custody of the Department of the Interior for disposition under the general land laws, or in such other manner as Congress may provide.

The regulations for the preservation of the title-papers, &c., of reservations (par. 1061, quoted above), should be amended so as to provide for a central office under the chief clerk in the War Department, where all such papers should be recorded, and preserved when completed. The present regulations provide that certain title-papers shall be filed in the bureaus, but it is often found necessary, when a question of title occurs, to search in several of the bureaus of the Department, in order to collect the papers. Many of the original deeds are on file or of record in the office of the Secretary of War. Time, which is sometimes of vital importance, is thus consumed, and occasionally it happens that important papers are overlooked, as was the case in the Presidio Reservation, when, but for Mr. Crosby's memory, a very important survey would have been overlooked, and the title to the property been jeopardized.

Where such valuable property is concerned, every precaution should be taken to guard against the loss of papers and to provide for their being duly recorded and preserved; and for this purpose there should be in the office of the Secretary of War a division of land records, in which should be filed the title-papers, &c., of all lands in the custody of the War Department, as well as other papers relating thereto. It should be the business of this division to see that all deeds are duly recorded; that the opinion of the Attorney-General as to the validity of title is obtained; that cession of jurisdiction is obtained when necessary; and that a plat of the site is filed. As rapidly as possible a history of each piece of property should be prepared, giving—

1st. Location.

2d. Descriptions by metes and bounds; number of acres. If any changes, their character and the authority therefor.

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3d. Buildings—number, kind, condition, and what other improvements.
4th. A plat of the site.
5th. How and when acquired; whether by purchase or reservation of public lands.
6th. Whether or not such possession has been continuous, giving facts.
7th. If reserved public land, whether prior to occupation by War Department there were settlements on the land; and, if so, what action has been taken relative thereto.
8th. If located within a State, has jurisdiction been ceded to the United States? Give date of act of cession, and see that a duly certified copy of the act is on file. In cases where there is a general land law of a State ceding jurisdiction over land purchased for military purposes, cite the act.
9th. If purchased, give date of opinion of Attorney-General as to validity of title.
10th. Whether the land is still required by the War Department.

Such a division should have a chief whose pay should equal the pay of a chief of division in the office of the Secretary of the Treasury. As it will be necessary for the chief to be absent at times, investigating cases, there should be an assistant chief. There should also be a draughtsman, and, say, one clerk of the fourth class, one third-class clerk, one first-class clerk, and one messenger. This force would be needed at first to bring up the records to date; then probably the force could be diminished.

Very respectfully, your obedient servant,

JOHN TWEEDALE,
Chief of Division.

The Hon. SECRETARY OF WAR.

Approved.

H. T. CROSBY,
Chief Clerk.

WAR DEPARTMENT,
Washington City, January 6, 1881.

The Secretary of War has the honor to invite the attention of Congress to his letter of the 23d April, 1880, transmitting a report relative to the public lands, forts, arsenals, &c., in the custody of the War Department, and recommending the creation of a division in his office to be known as the "Land-Title Division." (See Senate Ex. Doc. No. 158, Forty-sixth Congress, second session, copy inclosed; also book of estimates for the fiscal year ending June 30, 1882, pages 34 and 204.)

Special attention is again called to this matter on account of its importance. Questions are constantly arising which involve the jurisdiction of the United States over lands reserved for military purposes which might be avoided, or, at least, more easily settled and without the delay now occurring, if the department had the means of bringing all the title papers together, and having them examined by persons skilled in such work. They are now scattered through all the bureaus of the War Department, and it is the particular business of no one to make examinations, to collate facts, and to be fully informed of decisions and opinions governing this class of cases. Such cases as they arise are incidental to other current work of the department on which the clerical force is fully engaged.

Under the existing system it is difficult to determine such questions speedily, and great care is necessary, in order that the cases may be fully presented, and no important opinions and decisions overlooked.

The department has not the force to inaugurate a new system, and for the purpose of facilitating the public business, and putting the work on such a basis that the liability to mistakes shall be reduced to the minimum, I have submitted the estimate on page 34 of the book of estimates, and earnestly recommend the same to the favorable consideration of Congress.

Respectfully submitted.

ALEX. RAMSEY,
Secretary of War.

The SPEAKER
of the House of Representatives.

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LIST OF MILITARY RESERVATIONS REPORTED AS NO LONGER NEEDED FOR MILITARY PURPOSES, AND STILL IN THE CUSTODY OF THE WAR DEPARTMENT.

The following is a list of military reservations and portions of reservations which have been reported as no longer needed for military purposes, and which are still in the custody of the War Department. Compiled from information in the Adjutant-General's Office:

1. Bois Blanc Island ..... Michigan.
2. Fort Butler ..... New Mexico.
3. Camp Cady ..... California.
4. Fort Crittenden ..... Utah.
5. Camp Crittenden ..... Arizona.
6. Camp Crook ..... California.
7. Fort Fetterman (old wood reservation and portion of post reservation) ..... Wyoming Territory.
8. Camp Goodwin ..... Arizona.
9. Old Camp Grant ..... Arizona.
10. Camp Independence ..... California.
11. Island in the Missouri River east of Kansas City.
12. Fort Larned ..... Kansas.
13. Fort McPherson ..... Nebraska.
14. Fort McRae ..... New Mexico.
15. Oglethorpe Barracks ..... Savannah, Ga.
16. Fort Rapdall (portion of reservation) ..... Dakota Territory.
17. Fort Reading ..... California.
18. Fort Rice ..... Dakota Territory.
19. Rush Lake Valley ..... Utah.
20. Fort Sedgwick ..... Colorado and Nebraska.
21. Camp Sheridan ..... Nebraska.
22. Camp Three Forks Owyhee ..... Idaho Territory.
23. Fort Verde (garden tract only) ..... Arizona.
24. Fort Wilkins ..... Michigan.

Appended is a short statement in the case of each reservation, showing when established, location, recommendation, and reasons for abandonment, condition of buildings on the reservation, so far as known, and when reported for the action of Congress.

As will be seen from these statements, most of the reservations have been heretofore reported to Congress with recommendation for appropriate legislation, but without securing, as yet, the requisite authority to enable the department to dispose of the same.

R. C. DRUM,
Adjutant-General.

ADJUTANT-GENERAL'S OFFICE,
Washington, January 5, 1881.

BOIS BLANC ISLAND, MICHIGAN.

Located near Fort Mackinac, in the Straits of Mackinaw.

Military reservation declared by the President November 8, 1827 (embracing about one-half of the island), and used for the purpose of supplying the post of Fort Mackinac with fuel and timber.

Having become unnecessary for military purposes, and a continual source of expense to the department to keep off trespassers (it having valuable timber on it), and the military authorities having recommended its disposition, the reservation was reported by the department for the action of Congress by letters to the House of Representatives dated respectively, December 7, 1874, December 31, 1875, and March 20, 1878 (*vide* Report No. 19, H. R., Forty-fourth Congress, first session).

There is also a light-house reserve on the island.

The commanding officer at Fort Mackinac reported as follows, under date of December 18, 1874:

"There is no improvement on the island by the military. The old maps show government wharves or docks; they have long since been washed away or rotted down. They were small affairs, and evidently built for the purpose of getting out timber and wood for the use of the post."

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FORT BUTLER, N. MEX.

General Orders No. 6, Headquarters of the Army, March 12, 1860, directed the establishment of a 6-company post at some suitable location on or near the Canadian River, to be called "Fort Butler," and March 22, 1861, the Secretary of War approved of a military reservation at the site selected for the post, located on the Canadian River.

It appears that the site was never occupied for military purposes. It was located within the private land claim of Pablo Montayo, and became the subject of correspondence between the War and Interior Departments, and the War Department, deeming that the land must be held until Congress authorized its disposition, upon recommendation of the General of the Army, accordingly reported it for the action of that body by letters of March 9, 1874, and January 28, 1876, to the House of Representatives (*vide* H. Ex. Doc. No. 108, Forty-fourth Congress, first session).

(The report of the Secretary, in his letter dated January 28, 1876, was that so much of the Fort Butler military reservation as was not embraced in the reservation of Fort Bascom was no longer needed for military purposes. Subsequent investigation, however, showed that no reservation had been declared at Fort Bascom, the site of which was leased August 2, 1864, and abandoned to the lessor in January, 1871.)

CAMP CADY, CAL.

Post established April 23, 1865.

Located on the Mojave River, in San Bernardino County, about 150 miles northeast of Wilmington, and on the road to Fort Mojave, Arizona Territory.

Reservation declared by the President June 3, 1870, with an area of 1,562 acres, 2 roods, 33 perches, more or less.

Post discontinued and garrison withdrawn April 24, 1871, by orders of the department commander, the reservation and buildings being placed in charge of an agent.

January 24, 1874, the department commander requested that the reservation be relinquished by the Government and thrown open to settlement, for the reason that it was no longer required for military purposes and had not been garrisoned since March, 1871. This request was approved by the division commander, the General of the Army, and the Secretary of War, and the reservation was reported to Congress by War Department letter of April 22, 1874, to the United States Senate, with recommendation for legislation authorizing the *sale* of the reserve; and by letter of December 20, 1875, to that body, the Secretary recommended that authority be given for its *relinquishment to the Interior Department* (*vide* H. Ex. Doc. No. 25, Forty-fourth Congress, first session).

The buildings are of adobe, and were reported in 1872 as of little value. (See also Report No. 19, H. R., Forty-fourth Congress, first session.)

FORT CRITTENDEN, UTAH.

Post established August 24, 1858, and called "Floyd;" name changed to Fort Crittenden February 6, 1861.

Located in Cedar Valley to the south and west of Salt Lake City.

Reservation declared by the President July 14, 1859.

Area 93,703.61 acres, including the entire Cedar Valley.

Post abandoned July 27, 1861, and not since reoccupied.

In his annual report for 1878, page 141, under "abandoned military reservations," the Commissioner of the General Land Office says:

* * * * * * *

"The other reservation which is recommended to be restored to the public domain is Camp Floyd, in Utah, declared by the President July 14, 1859; name changed to Fort Crittenden February 6, 1861. The Secretary of War reports that the 'post was abandoned July 27, 1861, and not since occupied.' This reservation comprises all of Cedar Valley, and is in length 33 miles, and its greatest width 16 miles. The lines of public surveys were extended over it, and the settlements of Cedar City and Fairfield were made before the date of the order for reservation, which order includes the settlements. It does not appear that any government improvements exist either on Fort Thorn or Fort Crittenden."

CAMP CRITTENDEN, ARIZ.

Post established March 4, 1868.

Located on the old site of "Fort Buchanan" (which was abandoned in 1861) at the head of Sonoita Valley and River, about 55 miles south by east of Tucson.

Reservation declared by the President March 30, 1870, with an area of 3,278.084 acres.

Post abandoned January 22, 1873. It was built of adobe.

May 28, 1873, the department commander reported the post as of no further use for

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military purposes, in view of the establishment of new posts better located, and recommended that the reservation be thrown open for settlement.

Reservation reported for action of Congress by War Department letters, dated respectively December 20, 1873, and December 31, 1875, to the United States Senate.

March 13, 1878, the Secretary of War, in letter to Speaker of House Representatives, reported favorably on bill H. R. 3249, Forty-fifth Congress, second session, for the relinquishment of the reservation to the Interior Department.

CAMP CROOK, CAL.

Post established July 1, 1857, by General Clark, commanding department, upon the main emigrant road between California and Oregon

Located on Fall River, 7 miles north of Pitt River, in the Pitt River Valley, Shasta County.

No reservation declared by the President; but under special legislation as to California (*vide* opinion of Attorney-General Williams of May 24, 1873, General Orders 65 of 1873), the sanction of Congress is required for relinquishment of the site, which is two miles square.

Post abandoned June 1, 1869, and buildings sold in April, 1870, by authority of the War Department.

Reservation reported to Congress for relinquishment to Interior Department by War Department letters of January 4, and December 31, 1875, to the House of Representatives, published in H. Ex. Docs. No. 80, Forty-third Congress, second session, and No. 29, Forty-fourth Congress, first session. (See, also, Report No. 19, H. R., Forty-fourth Congress, first session.)

By letter of April 30, 1880, addressed to the chairman of the House Military Committee, the Secretary of War, recommended the passage of a bill (H. R. 5260) to restore the lands included in this reservation and that of Fort Reading, Cal., to the public domain, &c.

FORT FETTERMAN, WYO.

Reduction.

By letter of December 16, 1872 (published in Senate Ex. Doc. No. 14, Forty-second Congress, third session), the Secretary of War recommended to Congress that the reservation at this post be reduced in area from 60 square miles, as declared by the President June 28, 1869, to 12½ square miles, and by letter of February 8, 1878, to the President of the United States Senate he again called attention to the matter.

Old wood reserve.

In view of the selection of a *new* wood reservation for use of Fort Fetterman, the old wood reservation declared by the President August 29, 1872, became useless to the military, and its relinquishment was recommended to Congress by War Department letter of February 8, 1878, to the President of the United States Senate.

Under date of March 5, 1878, the Secretary of War, in accordance with a request of Senator Plumb, of the Military Committee, transmitted certain plats of the Fort Fetterman reservation, together with draught of a bill to carry out the recommendations made in War Department letter of February 8, 1878.

CAMP GOODWIN, ARIZONA.

Post established June 21, 1864.

Located near the Gila River, about 120 miles northeast of Tucson and 90 miles from San Pedro River, on the Southern Pacific Railroad.

Reservation declared by the President August 20, 1867, 6 miles square.

Post abandoned March 14, 1871.

Relinquishment of reservation to Interior Department recommended to Congress by Secretary of War (*vide* War Department letters February 15, 1876, to Senate and House of Representatives).

Subsequently a portion of the reserve was embraced in the "Camp Thomas" military reservation, declared by the President May 18, 1877, and another portion was embraced in the White Mountain Indian Reservation. The part left (about one-fourth of the original reservation) has but limited grazing facilities, and is of no value for agricultural purposes; there are no buildings upon it, and, by letter of January 29, 1878, to the Speaker of the House of Representatives, the Secretary of War laid the papers before Congress recommending the passage of a law authorizing its transfer to the Interior Department in lieu of former recommendation.

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OLD CAMP GRANT, ARIZ.

Post established November 1, 1865.

Location, at the confluence of the San Pedro and Arivapa Rivers, on the site of "Fort Breckenridge," 56 miles north of Tucson, and 100 miles east of Maricopa Wells.

Reservation declared by the President March 30, 1870, with an area of 2,031.70 acres.

Post abandoned March 31, 1873. It was built of adobe.

May 28, 1873, the department commander reported the post as of no further use for military purposes, a new post now known as "Fort Grant" having been established near Mount Graham, about 70 miles southeast, and recommended that the reservation be thrown open to settlement.

Reservation reported to Congress by War Department letters dated, respectively, December 20, 1873, and December 31, 1875, to the United States Senate, the former recommending legislation authorizing sale of the reserve and the latter its transfer to the custody of the Interior Department for disposition under the public land laws.

CAMP INDEPENDENCE, CAL.

Post established July 4, 1862.

Located on Oak Creek, in Owens River Valley, Inyo County, 2 miles north of the town of Independence.

Three reservations, post, wood, and grazing, declared by the President January 23, 1866.

Discontinued as a station for troops by Special Orders 80, Military Division of the Pacific, July 5, 1877, and garrison withdrawn July 20, 1877.

Most of the original buildings which were constructed of adobes, were destroyed by an earthquake, March 26, 1872. The present buildings are of frame.

March 25, 1878, General McDowell reported as follows:

"At the breaking out of the hostilities with the Nez Percés, under Joseph, I caused the post of Camp Independence to be broken up, and left in charge of an agent of the Quartermaster's Department: I then intended not to reoccupy this post, and had the public property withdrawn.

"The post consists of buildings recently put up at a cost of many thousands of dollars, and has two or three reservations of valuable land; one for the post, and the others for grazing and wood.

"Now that the completion of the Southern Pacific Railroad gives a speedy access to the country in which Camp Independence is situated, and the Indians have become harmless, I recommend the abandonment of the post, and that the land be sold in small bodies, in such way as the law may allow.

"The land, even without the buildings, is worth more than the usual price of $1.25 per acre. The buildings will have to be sold with the land." (*Vide* H. Ex. Doc. No. 79, Forty-fifth Congress, second session.)

The recommendation of the department for the disposition of the post and reservation is contained in letter of April 13, 1868, to Hon. B. Wadleigh, of the Senate Military Committee (copy herewith).

WAR DEPARTMENT,
Washington City, April 13, 1878.

SIR: In reply to your letter of the 2d instant, inclosing for information Senate bill 671, "for the relief of certain citizens of the United States, and occupants of lands within one mile of the military post of Camp Independence, Inyo County, California," I have the honor to invite your attention to the inclosed copy of a report, dated the 25th ultimo, from the commanding general Military Division of the Pacific, from which it will be seen that this post is no longer needed for military purposes. I would therefore respectfully recommend that a bill be introduced authorizing this department to transfer the Camp Independence military reservation, with the buildings thereon, to the custody and control of the Secretary of the Interior, for sale as recommended by General McDowell.

With reference to Senate bill 671, I would state that the military post of Camp Independence, Cal., was established July 4, 1862, and from that date no person could acquire title to land within one mile of said post, as section 7 of the act of March 3, 1853 (10 Stat., 247), provides with reference to lands in California that "no person shall make a settlement or location upon any tract or parcel of land selected for a military post or within one mile of such post. (See Opinion of Attorney-General of May 24, 1873, published in General Order 65 of 1873, copy herewith.)

Josiah Earl and others in 1873 made claim to certain lands within one mile of this military post. Their claim did not embrace any part of the United States reservation so far as the department is advised, but under the law above referred to their claim was rejected by the Commissioner of the General Land Office. General Schofield, then commanding

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the Military Division of the Pacific, forwarded the claim with remarks as follows: "In view of the well-known objections to citizens establishing themselves in close proximity to a post, I would recommend that no patent for the land in these cases be given until after the post has been abandoned; meantime the claimants will be allowed undisturbed occupation as long as they do not conduct themselves in such a way as to prejudice the interests of the public service."

The parties claim under the general land laws, and if authority for the transfer of the land to the Secretary of the Interior is granted, as above recommended, they will have their remedy before the Commissioner of the General Land Office.

Very respectfully, your obedient servant,

GEO. W. McCRARY,
Secretary of War.

Hon. B. WADLEIGH,
Of Committee on Military Affairs, United States Senate.

[General Orders No. 65.]

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, June 12, 1873.

The following opinion of the Attorney-General of the United States is published for the information and government of all concerned:

OPINION.

DEPARTMENT OF JUSTICE, *May 24, 1873.*

Hon. WILLIAM W. BELKNAP,
Secretary of War:

SIR: From the letter of the Acting Secretary of War of the 24th ultimo, and its inclosures, relative to the military post of Fort Reading, Cal., it appears that the post was established May 26, 1852, and garrisoned until April 1, 1856, when the troops were withdrawn, and that from the latter date until June 13, 1867, it was occupied but a few months, and, without further occupation by troops, was finally abandoned on the 6th of April, 1870, when the buildings pertaining to it were sold in pursuance of an order of the Secretary of War, of which abandonment notice was duly communicated to the General Land Office.

It further appears that no record can be found of any order of the President reserving land for military purposes at this post, or that a reservation was ever in any way formally declared. It does not appear what extent of land was actually occupied and used, whether only so much as was embraced within the lines of the work, or a larger tract.

The 6th section of an act approved June 12, 1858 (11 Stat., 336), provides (with an exception of certain reservations in the State of Florida) for the repeal of "all the existing laws or parts of laws which authorize the sale of military sites which are or may become useless for military purposes," and that "said lands shall not be subject to sale or pre-emption under any of the laws of the United States," and it is asked whether the facts above stated "are sufficient to constitute the post mentioned a military site within the meaning of this provision, so as to require the consent of Congress prior to its relinquishment and sale."

It is added that as there are many places occupied as military sites which, as in this instance, are such "only by occupancy," the War Department desires a rule for its guidance in such cases.

Before the enactment of this provision Congress had, by the act of 1819 (3 Stat., 520), and by various special acts, devolved upon the Secretary of War the duty of selling useless and abandoned military sites. There having been question whether the act of 1819 applied to any such sites except those undisposed of at the time of its passage, an act was passed March 3, 1857 (11 Stat., 203), extending the provisions of the former act "to all military sites, or to such parts thereof which are or may become useless for military purposes."

Finally, in consequence of complaints as to the manner in which this authority to sell had been exercised, the provision in the act of 1858 was adopted, by which all such sites are reserved from sale or pre-emption until otherwise ordered by Congress. There is no discrimination in its terms as to the value, situation, or extent of the sites; it comprehends all military sites or reservations, no matter what their extent, whether embraced within the actual lines of a post or fort, or including, in addition, more or less of the surrounding lands.

In Wilcox *vs.* Jackson (13 Peters, 513), it is held "that whensoever a tract of land shall have once been legally appropriated to any purpose, from that moment the land thus severed becomes severed from the mass of public lands, and that no subsequent law or

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proclamation would be construed to embrace it or to operate upon it, although no reservation were made of it."

Attorney-General Bates, in the case of the Rock Island military reservation (10 Opinions, 365), decides that it was not in the power of the President to relinquish that reservation, and thus throw the island back into the general body of the public lands, without the consent of Congress.

So far as concerns military posts in the State of California, a clause in the seventh section of the act of March 3, 1853, entitled "An act to provide for the survey of public lands," &c. (10 Stat., p. 247), rendered the reservation of land outside the lines of a fort or post, by executive authority, unnecessary. The clause reads as follows: "And no person shall make a settlement or location upon any tract or parcel of land selected for a military post, or within one mile of such post."

This provision in the act of 1853 would seem to leave no room for controversy as to Fort Reading. All settlements and locations by private parties are excluded not only from what is properly the military post, but from all land within one mile of it.

My opinion, therefore, is that Fort Reading is of that character of military sites contemplated by the sixth section of the act of June 12, 1858, and that the consent of Congress is necessary to its relinquishment and sale.

Very respectfully, your obedient servant,

GEO. H. WILLIAMS,
Attorney-General.

By order of the Secretary of War:

E. D. TOWNSEND,
Adjutant-General.

ISLAND IN THE MISSOURI RIVER, EAST OF KANSAS CITY.

March 10, 1865, the President of the United States directed that this island, situated in sections 28 and 33, township 50 north, of range 33 west, of the 5th principal meridian, containing 54.70 acres, be reserved for military purposes, with the view to the erection of a pest-house.

In 1872, the reservation not being required longer for military purposes, the Secretary of War recommended to Congress its relinquishment to the Interior Department. (*Vide* War Department letter, December 2, 1872, to the United States Senate.)

There are no government improvements on the Island.

FORT LARNED, KANS.

Post established October 22, 1859, as "Camp on Pawnee Fork;" designated "Camp Alert" February 1, 1860, and changed to Fort Larned June, 1860.

Located on the right bank of the Pawnee Fork, about 8 miles from its confluence with the Arkansas River, and 7 miles west from Larned Station on the Atchison, Topeka and Santa Fe Railway, in Pawnee County.

Reservation declared by the President January 3, 1865, 16 square miles.

Reported by department and division commanders in January, 1878, as no longer needed. (*Vide* H. Ex. Doc. 79, Forty-fifth Congress, second session.)

Post discontinued, upon suggestion of the Secretary of War, by Special Orders 109, Department of the Missouri, June 19, 1878, having fulfilled the purpose for which it was established, a guard being sent from Fort Dodge to protect buildings, &c., which were reported to be mostly sandstone, of very good quality, and valuable.

Sale of buildings ordered by Secretary of War December 6, 1878, on recommendation of department and division commanders and the Quartermaster-General, and measures about to be taken to report the reservation to Congress, when a report was read from department commander, dated December 21, 1878, that Indian troubles might compel use of post, which is on railroad, for concentrating and quartering troops. Accordingly, under date of January 14, 1879, the Secretary of War recalled the order for sale of buildings. In February, 1879, Lieutenant-General Sheridan reported, in connection with General Pope's letter of December 21, 1868, that *in his opinion* there never would be any military necessity for the occupation of Fort Larned.

In September, 1879, the department and division commanders both recommended the dismantling of the fort, the material to be transferred to Fort Dodge. The Secretary of War decided, however, that the structures of *stone* should be left to follow the land, when its disposition is authorized by Congress.

December 2, 1879, the following instructions were telegraphed the department commander:

"Understanding the quartermaster is moving buildings at Fort Larned, Secretary of War directs *all* operations be suspended there until action of Congress."

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November 30, 1880, Lieutenant-General Sheridan telegraphs that the reservation at Fort Larned ought to be reported to Congress for transfer or abandonment. (See, in this connection, bill S. 193, Forty-sixth Congress, and report No. 136 to accompany the same.

FORT M'PHERSON, NEBR.

Post established September 27, 1863, as "Cantonment McKean;" changed to "Post of Cottonwood" February, 1864; to "Fort Cottonwood," May, 1864, and to "Fort McPherson," February 20, 1866.

Located on the south side of the South Platte River 2 miles west of Cottonwood Springs, and about 6 miles southeast of McPherson Station, on the Union Pacific Railroad.

Reservation declared by the President January 22, 1867; enlarged January 25, 1867; further extended October 11, 1870; portion set apart for a national cemetery October 17, 1873, with boundaries as described in General Orders 103, Adjutant-General's Office, 1873 (copy herewith); further enlarged April 19, 1878.

January 24, 1878, the department commander reported that while no military necessity existed for troops at this post, its retention for a time was recommended, as there might be such necessity in some future contingency (*Vide* H. Ex. Doc. No. 79, Forty-fifth Congress, second session).

The post appears to have been built to accommodate a garrison of five companies, the buildings being of lumber, cedar frames and cedar logs; and under date of July 28, 1879, the department commander recommended its abandonment, in view of the dilapidated condition of the quarters as well as the necessity for soon ordering troops to build the new post in the Niobrara country, Fort Niobrara, Nebr., for which Congress appropriated the sum of $50,000.

This recommendation was approved by the Lieutenant-General, the General of the Army, and the Secretary of War, and the Lieutenant-General was advised accordingly in letter dated August 16, 1879, from the Adjutant-General's Office.

The garrison was withdrawn March 29, 1880, leaving a detachment which remained until June 20, 1880.

The post is now in charge of a non-commissioned officer, a sergeant of the Fifth Cavalry.

In telegram dated November 30, 1880, the Lieutenant-General stated that the reservation at this post should be reported to Congress for abandonment.

[General Orders No. 103.]

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE.
Washington, October 13, 1873.

By direction of the President, a tract of land within the limits of the present military reservation at Fort McPherson, Nebr., with boundaries as hereinafter described, is hereby set apart as a national cemetery.

BOUNDARIES.

Beginning at a point on the south bank of the South Platte River, marked by a wooden post, about four thousand and four hundred (4,400) feet from the flag-staff at Fort McPherson, and running thence westward up the south bank of the river thirteen hundred and twenty (1,320) feet to a wooden post; thence southward to the table-land of the ridge four thousand four hundred and forty (4,440) feet to a wooden post; thence eastward along the table of the ridge eight hundred (800) feet to a wooden post; thence northward four thousand and four hundred (4,400) feet to the point of beginning, the whole tract containing about one hundred and seven (107) acres.

By order of the Secretary of War:

E. D. TOWNSEND,
Adjutant-General.

FORT M'RAE, N. MEX.

Post established April 3, 1863.

Located at Ojo del Muerto (spring of the dead), in Socorro County, 3 miles east of the Rio Grande.

Reservation declared by the President May 28, 1869, 4 square miles.

Abandonment of post recommended August 16, 1872, by division commander, and approved by Secretary of War. Garrison withdrawn, but subsequently returned by Special Orders 132, paragraph 1, District of New Mexico, September 23, 1872. Garrison again withdrawn October 30, 1876, by orders from district headquarters, a detachment being left in charge of the post.

January 23, 1878, the department commander reported that the post could be given up (*vide* H. Ex. Doc. No. 79, Forty-fifth Congress, second session).

Abandoned post placed under immediate command of commanding officer of Fort Bliss.

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Tex., to station details, &c., under instructions from district headquarters by Special Orders 52, Headquarters District New Mexico, May 27, 1879.

Fort McRae was a one-company post, built of adobe.

An inspection report dated October 4, 1879, shows that the buildings were then being dismantled and the material, doors, sashes, boards, &c., to be used in the construction of new Fort Bliss, Tex.

OGLETHORPE BARRACKS, SAVANNAH, GA.

Site deeded to the United States by the city of Savannah, November 5, 1833—about three-fourths of an acre. Purchase made by authority of Congress at a cost of $12,000 for site. Thirty-five thousand dollars was appropriated for buildings for two companies, and additional appropriation of $25,000 was made subsequently.

Post established (on present site) about 1834.

Located in the central part of the city of Savannah, and occupying a square bounded on the north by Liberty street; on the east by Drayton street; on the south by Harris street; and on the west by Bull street.

Garrison withdrawn in April, 1879, and place left in charge of an ordnance sergeant.

Various applications from local organizations for use of the buildings have been denied by the department on the ground that Congress alone has the necessary authority.

By War Department letter of June 12, 1879, to the Speaker of the House of Representatives, the Secretary of War stated, in returning communication from the chairman of the Committee on Public Buildings and Grounds, concerning bill H. R. 2021, "to vest the title to the United States barracks in the city of Savannah, Ga., in the corporation of said city, for public uses," that the General of the Army reported adversely to such a disposition of these valuable buildings (which are principally of brick with slate roofs, and in good condition), and that, in accordance with his views, their sale to the highest bidder would be recommended to Congress at its next session (second session Forty-sixth Congress).

By War Department letters of May 22, 1880, to the Senate and House of Representatives, recommendation was made for such legislation by Congress as would authorize the sale to the highest bidder, after public advertisement, of the site and buildings occupied by the post of Oglethorpe barracks. (See also bill H. R. 3840, second session Forty-sixth Congress, to transfer barracks to Treasury Department for post-office and revenue purposes.)

FORT RANDALL, DAK.

Reduction.

Post established June 26, 1856, and still garrisoned.

Located on the right bank of the Missouri River, 75 miles by land above Yankton, and 100 miles or more by river.

Reservation declared by the President June 14, 1860.

September 9, 1867, that portion of the reservation north of the Missouri River and west of the Yankton Indian Reservation was relinquished to the Interior Department, but October 25, 1870, the reserve was, with consent of said department, restored to its original limits.

Under act of Congress approved May 18, 1874 (published in General Orders No. 47, of 1874, Adjutant-General's Office copy herewith), the Secretary of War transferred to the Interior Department certain portions of the reservation occupied by settlers prior to the date of the President's order declaring the same, or while not under military control, between the years 1867 and 1870.

By letter of December 2, 1879, the Secretary of War recommended to the House of Representatives the relinquishment to the Interior Department of the portion of the reserve north of the Missouri River not already confirmed to settlers under the act of Congress approved May 18, 1874, before mentioned. The portion thus recommended for relinquishment is located in Charles Mix County. (See in this connection bill H. R. 4575, Forty-sixth Congress, second session, and Report No. 744, accompanying same.)

[General Orders No. 47.]

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, May 25, 1874.

The following acts of Congress are published for the information and government of all concerned:

AN ACT for the relief of certain settlers on the Fort Randall military reservation.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of War be, and he is hereby, authorized to transfer

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to the custody of the Department of the Interior such portions of the military reservation of Fort Randall, in Dakota, as were actually occupied by settlers prior to the promulgation of the order of the President of June fourteenth, eighteen hundred and sixty, setting apart the reservation for military purposes, and, further, such portions of the said reservation as were released from military occupation and control between the years eighteen hundred and sixty-seven and eighteen hundred and seventy, and were during that time settled upon in good faith and in the belief that the lands were open to settlement.

SEC. 2. That the Secretary of the Interior be authorized to confirm, in accordance with existing laws, the titles of such settlers upon the military reservation of Fort Randall as may be reported by the Secretary of War for that purpose, and to cause patents to be issued for such lands as the aforesaid settlers may be entitled to under existing laws and the provisions of this act.

SEC. 3. That the Secretary of the Treasury be, and he is hereby, authorized to pay to each of the aforesaid settlers the respective amounts that were appraised as the value of their respective improvements, by a military board of survey convened for that purpose at Fort Randall, under instructions from the War Department, dated March third, eighteen hundred seventy-one: *Provided*, That in case any improvements, or portion thereof, shall have been restored or delivered to any settler, after the appraisement of the same by the said military board of survey, such settler shall not be entitled to payment under this act for the improvements, or portion thereof so restored or delivered to him.

Approved May 18, 1874.

By order of the Secretary of War:

E. D. TOWNSEND,
Adjutant-General.

FORT READING, CAL.

Post established May 26, 1852.

Located in Shasta County, about 2½ miles from the mouth of Cow Creek where it empties into the Sacramento River, about 20 miles southwest of Shasta City, Cal.

The facts relative to the establishment of the post, its occupancy, abandonment, and a history of the reservation are set forth in the accompanying general order, publishing opinion of the Attorney-General upon the subject. (General Orders No. 65 of 1873.)

Under this opinion, the Secretary of War, under date of June 24, 1873, advised the Interior Department that the site of Fort Reading would be retained by this department until Congress authorized its sale.

By letter of April 7, 1876, to the House of Representatives, the Secretary of War recommended that a bill (H. R. 1950) for the restoration of the reserve to the public domain be amended so as to authorize its transfer to the Interior Department for disposition.

By letter of April 20, 1880, addressed to the chairman of the House Military Committee, the Secretary of War recommended the passage of a bill (H. R. 5260) to restore the lands included in this reservation and that of Fort Crook, California, to the public domain. (See also S. 1487, Forty-sixth Congress, second session.)

[General Orders No. 65.]

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, June 12, 1873.

The following opinion of the Attorney-General of the United States is published for the information and government of all concerned:

OPINION.

DEPARTMENT OF JUSTICE, *May* 24, 1873.

Hon. WILLIAM W. BELKNAP,
Secretary of War:

SIR: From the letter of the Acting Secretary of War of the 24th ultimo, and its inclosures, relative to the military post of Fort Reading, California, it appears that the post was established May 26, 1852, and garrisoned until April 1, 1856, when the troops were withdrawn, and that from the latter date until June 13, 1867, it was occupied but a few months, and, without further occupation by troops, was finally abandoned on the 6th of April, 1870, when the buildings pertaining to it were sold in pursuance of an order of the Secretary of War, of which abandonment notice was duly communicated to the General Land Office.

It further appears that no record can be found of any order of the President reserving lands for military purposes at this post, or that a reservation was ever in any way for-

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mally declared. It does not appear what extent of land was actually occupied and used; whether only so much as was embraced within the lines of the work, or a larger tract.

The sixth section of an act approved June 12, 1858 (11 Stat., 336), provides, with an exception of certain reservations in the State of Florida, for the repeal of "all the existing laws or parts of laws which authorize the sale of military sites which are or may become useless for military purposes," and that "said lands shall not be subject to sale or pre-emption under any of the laws of the United States," and it is asked whether the facts above stated "are sufficient to constitute the post mentioned a military site within the meaning of this provision, so as to require the consent of Congress prior to its relinquishment and sale."

It is added that as there are many places occupied as military sites which, as in this instance, are such "only by occupancy," the War Department desires a rule for its guidance in such cases.

Before the enactment of this provision Congress had, by the act of 1819 (3 Stat. 520), and by various special acts, devolved upon the Secretary of War the duty of selling useless or abandoned military sites. There having been question whether the act of 1819 applied to any such sites except those undisposed of at the time of its passage, an act was passed March 3, 1857 (11 Stat., 203), extending the provisions of the former act "to all military sites, or to such parts thereof which are or may become useless for military purposes."

Finally, in consequence of complaints as to the manner in which this authority to sell had been exercised, the provision in the act of 1858 was adopted, by which all such sites are reserved from sale or pre-emption until otherwise ordered by Congress. There is no discrimination in its terms as to value, situation, or extent of the sites. It comprehends all military sites or reservations, no matter what their extent, whether embraced within the actual lines of a post or fort, or including in addition more or less of the surrounding lands.

In Wilcox *vs.* Jackson (13 Peters, 513) it is held "that whensoever a tract of land shall have once been legally appropriated to any purpose, from that moment the land thus severed becomes severed from the mass of public lands, and that no subsequent law or proclamation would be construed to embrace it or to operate upon it, although no reservation were made of it."

Attorney-General Bates, in the case of the Rock Island military reservation (10 Opinions, 365), decides that it was not in the power of the President to relinquish that reservation, and thus throw the island back into the general body of public lands, without the consent of Congress.

So far as concerns military posts in the State of California, a clause in the seventh section of the act of March 3, 1853, entitled "An act to provide for the survey of public lands," &c. (10 Stat., p. 247), rendered the reservation of land outside of the lines of a fort or post, by executive authority, unnecessary. The clause reads as follows: "And no person shall make a settlement or location upon any tract or parcel of land selected for a military post or within one mile of such post."

This provision in the act of 1853 would seem to leave no room for controversy as to Fort Reading. All settlements and locations by private parties are excluded not only from what is properly the military post, but from all land within one mile of it.

My opinion, therefore, is that Fort Reading is of that character of military sites contemplated in the sixth section of the act of June 12, 1858, and that the consent of Congress is necessary to its relinquishment and sale.

Very respectfully, your obedient servant,

GEO. H. WILLIAMS,
Attorney-General.

By order of the Secretary of War:

E. D. TOWNSEND,
Adjutant-General.

FORT RICE, DAK.

Post established July 11, 1864.

Located on the west bank of the Missouri River, about 10 miles above the mouth of the Cannon Ball River, and 28 miles south from Bismarck, on the Northern Pacific Railroad.

Reservation declared by the President September 2, 1864, and (the same lands) January 22, 1867; 25 miles long and about 7 miles wide.

January 27, 1878, Lieutenant-General Sheridan recommended that the post be broken up, having fulfilled the objects for which it was built, and as the troops could be quartered elsewhere without any additional expense. (See H. Ex. Doc. 79, Forty-fifth Congress, second session.)

Post abandoned and garrison withdrawn November 25, 1878 (per Special Orders 133,

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Department Dakota, November 18, 1878), pursuant to a letter of authority from the Adjutant-General's Office to the Lieutenant-General, dated May 16, 1878, which also directed that after the withdrawal of the garrison the fact be reported with information as to whether or not the reservation would again be required for military purposes, in order that if not needed steps might be taken for its disposition.

A detachment remained to transfer property and destroy post until February 6, 1879.

January 24, 1880, the department chief quartermaster reported that all public buildings and other public property had been removed from Fort Rice, and February 24, 1880, the department commander reported that the reservation was no longer required for military purposes.

RUSH LAKE VALLEY, UTAH TERRITORY.

Not a military post, nor occupied by troops since the late war.

Reservation located in Tooele County, about 44 miles southwest from Camp Douglas, in townships 4 and 5 south, range 5 west of Salt Lake meridian, and declared by the President February 4, 1855.

The reserve was used by the Quartermaster's Department as grazing grounds, corral, &c., and in September, 1868, was reported as of no further use to that department.

By War Department letter of March 6, 1869, the subject of the abandonment of the reservation was laid before the House of Representatives with recommendation that as it was no longer required for military purposes, its disposition be authorized by law; but no legislation appears have been had in the matter, and by War Department letter of December 13, 1869, the reservation was relinquished to the Interior Department; this relinquishment was *withdrawn* July 29, 1873, not being *valid* in view of the opinion of the Attorney-General of May 24, 1873, in the Fort Reading case. The reservation was again reported to the House of Representatives by War Department letters of January 23 and March 23, 1874, recommending its transfer to the Interior Department. (*Vide* H. Ex. Docs. Nos. 96 and 197, Forty-third Congress, first session, and bill H. R. 1756, Forty-sixth Congress, first session.)

The following extract from a report of the commanding officer, Fort Douglas, gives additional information relative to this reservation. The Secretary of War has declined to grant applications to occupy portions of the reserve pending action of Congress.

FORT DOUGLAS, UTAH, *April* 12, 1880.

To the ADJUTANT-GENERAL, U. S. A.,
Washington, D. C.:
(Through Headquarters Department of the Platte, Fort Omaha, Nebr.)

SIR: I have the honor to return herewith the application of P. T. Handy, esq., in behalf of the First National Mining Company, for permission to occupy a tract of land at the north end of Rush Lake, on a military reservation, and beg leave to submit the following report:

The military reservation at Rush Lake, Utah, is distant 40 miles, in southwest direction from Salt Lake City, and about 12 miles due north from Old Camp Floyd. It was reserved (or at his request) by Colonel Steptoe for the purpose of grazing and hay ground. It was reoccupied and fenced in by General P. E. Connor, United States volunteers, in 1864, for the same purposes. In 1865 water accumulated, forming a lake, covering the grass lands. It was abandoned since, and is of no value for military purposes.

A number of people have settled on the reservation near the lake. On the southeastern portion there is a small town containing about forty houses (called town of Rush Lake), the Chicago Smelter (extensive smelting works); also on the north end of the lake extensive smelting works called the "Waterman." The latter company have fenced in all the available land on the north end of the lake. I have not been able to learn by what authority they have located upon the reservation further than that they claim they have permission. * * *

I have the honor to be, very respectfully, your obedient servant,

JNO. E. SMITH,
Colonel Fourteenth Infantry, Commanding Fort Douglas.

FORT SEDGWICK, COLO. AND NEBR.

Post (in Colorado) established May 17, 1864, and called Camp Rankin; name changed to Fort Sedgwick September 27, 1865.

Location on the South Fork of the Platte River, opposite the mouth of the Lodge-Pole Creek, near Julesburg, Colo., on the Union Pacific Railroad.

Reservation declared by the President June 28, 1869, 8 miles square, 64 square miles.

Post abandoned May 31, 1871, by authority of the Secretary of War, as being of no further use in a military point of view.

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In letter of March 28, 1876, to Senator Cockrell, of the Senate Military Committee, the Secretary of War, in transmitting copy of report of the Lieutenant-General and of indorsement of the General of the Army, suggested that a bill (S. 47) to reopen the lands of the reservation to settlement and occupation as public lands be amended so as to authorize the Secretary of War to transfer said reservation to the custody and control of the Interior Department for disposition. The bill was reported with the amendment suggested, but failed to become a law.

March 17, 1876, Lieutenant-General Sheridan reported as follows:

"There are no improvements of any value to the government that I am aware of, and the point at the present time possesses no military advantages."

(In this connection attention is invited to bill S. No. 1742, Forty-sixth Congress, second session, and report No. 661, to accompany same.)

CAMP SHERIDAN, NEBR.

Post established at its present location in September, 1874.

Located on the east bank of the West Fork of Beaver Creek (a tributary of White River, into which it empties about 12 miles farther north), and one-quarter mile from the Spotted Tail Indian Agency, as established just prior to that time, but which was removed about three years later, and is now known as "Rosebud Agency," in *Dakota Territory*.

Reservation declared by Executive order dated November 14, 1876; extended by Executive order dated April 28, 1879, and further enlarged by Executive order dated December 10, 1879, for the purpose of supplying wood and timber for use of the post.

Area of enlarged reservation, $28\frac{9}{10}\frac{5}{0}$ square miles.

Abandonment of post recommended by department commander August 8, 1880; approved by the Lieutenant-General and the General of the Army, and directed by the Secretary of War November 22, 1880, who also directed that report be made to Congress that the post was no longer needed for military purposes, with recommendation that the reservation be returned to the public domain.

The Lieutenant-General was advised accordingly by letter of December 2, 1880, from the Adjutant-General's Office, and instructed to report relative to location, condition, &c., of improvements on the reserve. When his report is received the matter will be *specially* reported for the action of Congress.

CAMP THREE FORKS OWYHEE, IDAHO.

Post established at its present location in September, 1866, and called "Camp Winthrop"; name changed to Camp Three Forks Owyhee in April, 1867.

Located about 35 miles south of Silver City and 16 miles north from the Three Forks of the Owyhee River.

Four reservations declared by the President April 6, 1869, and announced in General Orders No. 29, Department Columbia, September 23, 1869, copy herewith.

Part of the hay reserve is in Oregon.

Garrison withdrawn in May, 1871, and in August of that year the abandonment of the post and sale of public buildings thereat were recommended by department and division commanders, the Quartermaster-General, and the General of the Army, and authorized by the Secretary of War. In compliance with instructions contained in letter of August 22, 1871, from this office the department commander reported, under date of January 25, 1872, that the buildings were duly advertised and sold at public auction *October* 23, 1871, and that the transfer of the buildings was made to the purchaser immediately thereafter, which *completed* the abandonment of the post. He also recommended that measures be taken to transfer the reservation to the Interior Department, as it was not probable that it would again be required for military purposes.

The reservations were reported by the Secretary of War to the House of Representatives in letter of March 4, 1872, with recommendation that Congress authorize their transfer to the Department of the Interior for public entry and sale.

[General Orders No. 29.]

HEADQUARTERS DEPARTMENT OF THE COLUMBIA,
Portland, Oreg., September 23, 1869.

The President having declared the reservation at Camp Three Forks Owyhee, Idaho, as set apart for military purposes, the limits of said reservation are hereby announced for the information of all concerned:

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Post reserve.

One (1) mile north and south, by one and one-half (1½) miles east and west: central point one-fourth (¼) of a mile west of camp flag-staff.

Wood reserve.

One (1) mile north and south, by two (2) miles east and west. Initial point, the northwest corner, to be at the wood-camp well. Bears east-northeast, nearest point four and three-fourths (4¾) miles from flag-staff.

Grazing reserve.

Two (2) miles north and south, by two (2) miles east and west. Initial point, the southeast corner, to be the same as the northeast corner of the post reserve.

Water reserve.

Twenty-five (25) yards each side of Dry Creek from the point where it leaves the wood reserve to the point where it enters the post reserve.

By command of Bvt. Maj. Gen. George Crook.

A. H. NICKERSON,
Captain, Twenty-third Infantry, A. D. C. and A. A. General.

FORT VERDE, ARIZ.

Garden tract.

The "Garden tract" at this point (formerly "Camp Verde"), declared by the President October 24, 1871, being no longer required for military purposes, the Secretary of War recommended to Congress its relinquishment June 19, 1876, in letter to United States Senate. This tract was in *addition* to the original post reservation, and is 1½ miles by 3 miles 40 rods in extent. The post was subsequently relocated and the reservation enlarged to include the new site and another tract for use as a post garden by Executive order of August 17, 1876.

FORT WILKINS, MICH.

Post established May 28, 1844.

Located on Lake Superior, at "Copper Mine Harbor," 10 miles from Keweena Point.

Reservation declared by the President August 19, 1853, embracing lots 2 and 3 of section 33, and lot 5 of section 34, township 59 north, range 28 west, Michigan.

Post directed to be discontinued by Special Order 90, Department of the Lakes, August 15, 1870, and troops withdrawn August 30, 1870.

The Secretary of War recommended to Congress relinquishment of the reservation in letter December 20, 1870, to House of Representatives, and in letter to same body, dated March 5, 1874, he called attention to former letter, and recommended that authority be granted to dispose of the reserve (*vide* H. Ex. Doc. No. 176, Forty-third Congress, first session).

In letter of May 25, 1874, the Secretary of War transmitted to the House of Representatives, for the information of the Committee on Military Affairs, in compliance with a request of said committee, a copy of report of General Hancock in regard to the quantity of land, and the value of buildings thereon, included in the reservation. The buildings are in charge of an agent appointed by the Quartermaster's Department. They are of log and frame, and not of any great value.

Forty-seventh Congress, first session, House Ex. Doc. No. 225.

Letter from the Secretary of War, relative to the subdivision of the reservations of Forts Dodge and Wallace, and the sale of buildings thereon.

JULY 21, 1882.—Referred to the Committee on Military Affairs and ordered to be printed.

WAR DEPARTMENT,
Washington City, July 20, 1882.

SIR: I have the honor to transmit herewith copy of correspondence relative to the disposal of the lands and buildings at the abandoned military posts of Forts Dodge and Wallace, Kansas.

In a telegram dated July 10, 1882 (copy herewith), Lieutenant-General Sheridan states

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that, in view of the delay which is occurring in disposing of the public buildings at said posts, he and General Pope recommend that they be sold in order that the Army may be relieved of the responsibility and expense of their further care.

The military reservations of Forts Dodge and Wallace have already been reported to the present Congress as no longer needed for military purposes, and authority asked to dispose of them (*vide* H. R. Ex. Doc. No. 39, Forty-seventh Congress, first session, pp. 3, 6, 22, and 23, accompanying).

Attention is respectfully invited to the inclosed copy of Ex. Doc. 195, Forty-seventh Congress, first session, showing action now pending in Congress respecting the Fort Dodge Reservation, from which it appears that the Secretary of the Interior has recommended an amendment to the act of December 15, 1880, opening up to settlement that portion of the reservation north of the railroad right-of-way, for the reason that a portion of the reservation ordered sold is included in the *Osage Indian Trust Lands* (treaty of 1865).

The chief quartermaster of the Department of the Missouri expresses the belief that, as many of the buildings at said post are built of stone and adobe, if sold *to be removed* they would bring about $10,000, but if sold with the immediate grounds upon which they stand will bring about $50,000.

In view of the advantage that it seems will accrue to the government from the sale of the buildings in connection with the land upon which they are located, it is respectfully requested that such legislation be had as will authorize the Secretary of War to subdivide the reservations in question, and sell the buildings with the grounds upon which they are located.

Very respectfully, your obedient servant,

W. E. CHANDLER,
Acting Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

[Telegram.]

HEADQUARTERS MILITARY DIVISION OF THE MISSOURI,
Chicago, Ill., June 20, 1882.

General R. C. DRUM, *Washington, D. C.:*

Your dispatch of this date about Fort Dodge received and forwarded for the consideration of General Pope, the department commander.

My orders in abandoning Fort Dodge were to transfer to Fort Supply such public property as could be made useful in the repairs of that post. I am willing to sell the post or give it away. Our experience heretofore in the sale of buildings at abandoned military posts has been about equivalent to giving them away. To sell the buildings and the land on which they stand requires an act of Congress.

P. H. SHERIDAN,
Lieutenant-General.

[Indorsement.]

ADJUTANT-GENERAL'S OFFICE,
Washington, June 21, 1882.

Respectfully submitted to the Secretary of War.

This dispatch is in reply to telegram of yesterday to General Sheridan communicating to him the views of Senator Plumb as to the disposition of the buildings at Fort Dodge.

R. C. DRUM,
Adjutant-General.

[Translated copy of telegram.]

HEADQUARTERS DEPARTMENT OF MISSOURI,
Chicago, Ill., June 25, 1882.

General JNO. POPE, *Fort Leavenworth, Kans.:*

The following telegram is repeated to you for the necessary action.

By command of Lieutenant-General Sheridan.

R. WILLIAMS,
Assistant Adjutant-General.

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WASHINGTON, D. C., *June* 24.

General P. H. SHERIDAN, *Chicago, Ill.:*

Your dispatch of this date relative to buildings at Fort Dodge received.

The Secretary of War has no opinion on the subject of disposition of buildings, but as representations are made that the buildings can be sold as they stand (to be removed) to better advantage of the Government than by tearing them down and using the material elsewhere, he desires to know whether any efforts have been made by General Pope to ascertain if this is the fact. If he has not, the Secretary thinks such efforts should be made.

R. C. DRUM,
Adjutant-General.

[Indorsements.]

HEADQUARTERS DEPARTMENT OF THE MISSOURI,
Fort Leavenworth, Kans., June 26, 1882.

Respectfully referred to the chief quartermaster of the department for report as soon as possibly can on the value of the buildings as they stand and what they will sell for.

By order of Brigadier-General Pope.

E. R. PLATT,
Major and Assistant Adjutant-General.

CHIEF QUARTERMASTER'S OFFICE, DEPARTMENT OF THE MISSOURI,
Fort Leavenworth, Kans., June 28, 1882.

Respectfully returned to the adjutant-general of the department.

As many of the buildings at Fort Dodge are built of stone and of adobe, it is believed that if sold to be removed they will bring about $10,000; but if sold with immediate grounds on which they stand, thus avoiding removal, it is believed that they would bring about $50,000.

J. D. BINGHAM,
Deputy Quartermaster-General, Chief Quartermaster.

HEADQUARTERS DEPARTMENT OF THE MISSOURI,
Fort Leavenworth, Kans., June 29, 1882.

Respectfully forwarded to the adjutant-general of the Military Division of the Missouri.

Attention is invited to the indorsement of the chief quartermaster of the department. The ground on which the buildings stand cannot be sold without an act of Congress.

JOHN POPE,
Brevet Major-General, Commanding.

HEADQUARTERS MILITARY DIVISION OF THE MISSOURI,
Chicago, July 3, 1882.

Respectfully forwarded to the Adjutant-General of the Army.

P. H. SHERIDAN,
Lieutenant-General, Commanding.

HEADQUARTERS OF THE ARMY,
Washington, July 6, 1882.

Respectfully submitted to the Secretary of War, in connection with previous papers in the case submitted by me on the 28th instant (ult.?).

W. T. SHERMAN,
General.

[Telegram.]

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, June 20, 1882.

Lieutenant-General SHERIDAN, *Chicago, Ill.:*

Senator Plumb advises the Secretary of War that, in dismantling and removing parts of buildings at Fort Dodge, the best and most economical disposition is not being made of government property; that buildings ought to be sold at public or private sale on the ground. The Secretary desires these views submitted for such action as you think proper.

R. C. DRUM,
Adjutant-General.

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[Telegram.]

WAR DEPARTMENT,
Washington, D. C., June 20, 1882.

Lieut. Gen. P. H. SHERIDAN, *Chicago, Ill.:*

Further representations made to the Secretary of War as to improvidence of tearing down the buildings at Fort Dodge suggest whether it would not be best to defer operations in this direction until satisfactorily informed which would be best for the government interests—to tear down the buildings and dispose of the material by sale or transportation elsewhere, or to sell the buildings as they stand at private or public sale, subject to removal from the reservation.

R. C. DRUM.
Adjutant-General.

[Telegram.]

HEADQUARTERS MILITARY DIVISION OF THE MISSOURI,
Chicago, Ill., June 21, 1882.

General R. C. DRUM, *Washington, D. C.:*

Please inform the Secretary of War that I have directed General Pope to suspend operations at Fort Dodge until it is ascertained if the public property there can be disposed of by public or private sale with more economy to the government than transferring it to Fort Supply, where it is very much needed.

P. H. SHERIDAN,
Lieutenant-General.

[First indorsement.]

ADJUTANT-GENERAL'S OFFICE,
Washington, June 21, 1882.

Respectfully submitted to the Secretary of War in connection with previous telegram from General Sheridan, submitted this day, and inviting attention to inclosed copy of telegram to the Hon. Mr. Ryan.

R. C. DRUM,
Adjutant-General.

[Telegram.]

ADJUTANT-GENERAL'S OFFICE,
Washington, June 21, 1882.

Hon. THOMAS RYAN, *House of Representatives, Capitol:*

General Sheridan reports he has suspended operations at Fort Dodge until he can make inquiry whether property can be profitably sold, as you suggested.

R. C DRUM,
Adjutant-General.

[Telegram.]

FORT LEAVENWORTH, KANS., *June* 21, 1882.

General P. H. SHERIDAN, *Chicago, Ill.:*

Your telegram stopping the dismantling of Fort Dodge received, and orders given accordingly. The material at Fort Dodge is very essential to quarter the troops sent from here to Supply. If the buildings are sold it will be for a small price and the money turned into the Treasury. Other material of the same kind and quality will have to be bought for the same purpose, and will probably cost twice as much. Unless the money received for the sale of goods is applied to build quarters for the troops to be removed from there, it will not be economy to sell. Even in this case the economy is doubtful.

JOHN POPE,
Brevet Major-General, Commanding.

[First indorsement.]

HEADQUARTERS MILITARY DIVISION OF THE MISSOURI,
Chicago, June 23, 1882.

Respectfully forwarded to the Adjutant-General of the Army.

P. H. SHERIDAN,
Lieutenant-General, Commanding.

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HEADQUARTERS DEPARTMENT OF THE MISSOURI,
Fort Leavenworth, Kans., June 23, 1882.

Col. R. WILLIAMS,
Adjutant-General Military Division of the Missouri, Chicago, Ill.:

COLONEL: I telegraphed you this morning asking whether I should consider the dismantling of Fort Dodge to be permanently put a stop to by the order of the War Department, so that I might know whether to keep the company of infantry retained there to do the work of dismantling and shipping to Fort Supply, or send the company at once to its post. Colonel Potter, under my order, is now at Dodge to superintend this work, and to ship to his post, to which two-thirds of the late garrison at Dodge is ordered, all material that can be judiciously and economically used to shelter these troops.

I cannot say what Fort Dodge would sell for in open market, but certainly I should say it would not bring half the value of the material which we could use at Supply. The money received from the sale of the post would of course revert to the Treasury, and it be necessary, therefore, to take out of the appropriation for the next fiscal year the amount needed to shelter the troops at Supply, which we could probably do with the material we could get out of Dodge.

The War Department can tell as well as I can whether, in view of the interests of the Army and the economy of sheltering the troops sent away from Dodge, the sale of this post to private parties or the transfer of the materials to supply, will best serve the interests of the military service.

I respectfully ask an early reply for obvious reasons.

I am, Colonel, very respectfully, your obedient servant,

JOHN POPE,
Brevet Major-General, Commanding.

[First indorsement.]

HEADQUARTERS MILITARY DIVISION OF THE MISSOURI,
Chicago, June 26, 1882.

Respectfully forwarded to the Adjutant-General of the Army.

In accordance with the wishes of the Secretary of War, I have instructed General Pope to ascertain if it will be more advantageous to the government to sell the buildings at Fort Dodge than to tear them down and use the material at Fort Supply.

This paper has in the mean time been received and I forward it for the information of the proper authority.

P. H. SHERIDAN,
Lieutenant-General Commanding.

[Second indorsement.]

HEADQUARTERS OF THE ARMY,
Washington, D. C., June 28, 1882.

Respectfully submitted to the honorable Secretary of War.

Usually, when a military post is abandoned it has been found more economical to dismantle the buildings and use elsewhere the doors, windows, casings, floors, &c., at the nearest post. If sold at auction the money received is nothing, because it must go back to the Treasury as miscellaneous receipts.

W. T. SHERMAN, *General.*

[Telegram.]

CHICAGO, ILL., *June 24, 1882.*

General R. C. DRUM, *Washington, D. C.:*

I respectfully request that the honorable Secretary of War decide what shall be done with the buildings at Fort Dodge as speedily as possible. General Pope and myself are of the opinion that they can be best utilized on repairs at Forts Supply and Riley, but we do not object to any other disposition of them which may be thought better.

P. H. SHERIDAN,
Lieutenant-General.

[Telegram.]

ADJUTANT-GENERAL'S OFFICE,
Washington, June 24, 1882.

General P. H. SHERIDAN, *Chicago, Ill.:*

Your dispatch of this date, relative to buildings at Fort Dodge, received.

The Secretary of War has no opinion on the subject of the disposition of buildings, but as representations are made that the buildings can be sold as they stand to be removed

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to the better advantage of the Government than by tearing them down and using the material elsewhere, he desires to know whether any efforts have been made by General Pope to ascertain if this is the fact. If he is not, the Secretary thinks such efforts should be made.

R. C. DRUM,
Adjutant-General.

UNITED STATES SENATE,
Washington, D. C., June 20, 1882.

Hon. ROBERT T. LINCOLN,
Secretary of War:

SIR: Dispatches from Fort Dodge, Kans., say that the military buildings on the reservations are being dismantled in order that some articles of value may be taken to Camp Supply. This will do the government no good—will, in fact, be expense without compensation; and if the government is to be benefited it would be far better to authorize the sale of all the improvements at public or private sale. In view of these facts and of the feeling existing on the frontier at this action, I respectfully ask that the demolition be suspended by order, to be transmitted by wire, until definite action can be taken for the disposition of the entire property.

Respectfully yours,

P. B. PLUMB.

WAR DEPARTMENT,
Washington City, June 22, 1882.

SIR: Referring to your letter of the 20th instant, relative to the disposition of property at Fort Dodge, Kans., and to my reply thereto of the same date, advising you that the substance of your letter had been communicated to General Sheridan by telegraph for an expression of his views on the subject, I have now the honor to quote for your information, below, a telegram from that officer, just received:

"Your dispatch of this date about Fort Dodge, received, and forwarded for the consideration of General Pope, the department commander. My orders abandoning Fort Dodge were to transfer to Fort Supply such public property as could be made useful in the repairs of that post. I am willing to sell the post or give it away. Our experience heretofore in the sale of buildings at abandoned military posts has been about equivalent to giving them away. To sell the buildings and the land on which they stand requires an act of Congress"

Very respectfully, your obedient servant,

ROBERT T. LINCOLN,
Secretary of War.

Hon. P. B. PLUMB,
United States Senate.

WAR DEPARTMENT,
Washington City, June 20, 1882.

SIR: I have your letter of to-day respecting the disposition of property at Fort Dodge.

Fort Dodge was ordered to be abandoned as a military station some two months ago, and the proper disposition directed to be made of the government property.

Such a matter as this is in charge of Lieutenant-General Sheridan, and I cannot interfere with his action, having at present no knowledge of what his orders in detail are, nor any information on which to base an opinion of my own.

In consequence of your letter, however, I have directed that a telegram be sent to General Sheridan, of which a copy is inclosed to you herewith.

ROBERT T. LINCOLN,
Secretary of War.

Hon. P. B. PLUMB,
United States Senate.

[Telegram.]

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, June 20, 1882.

Lieut. Gen. P. H. SHERIDAN, *Chicago, Ill.:*

Senator Plumb advises the Secretary of War that in dismantling and removing parts of buildings at Fort Dodge, the best and most economical disposition is not being made of Government property; that buildings ought to be sold at public or private sale on the ground. The Secretary desires these views submitted for such action as you think proper.

R. C. DRUM,
Adjutant-General.

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CHICAGO, ILL., *July* 10, 1882.

General R. C. DRUM, *Washington, D. C.:*

In view of the delay which is occurring in disposing of the public buildings at Forts Dodge and Wallace, General Pope and myself recommend that the Secretary of War give authority to sell them to the highest bidder, after advertising for thirty days. As it is now, we have to keep a company at Fort Dodge and a detachment at Fort Wallace to watch them.

P. H. SHERIDAN,
Lieutenant-General.

HEADQUARTERS OF THE ARMY,
Washington, July 13, 1882.

Respectfully submitted to the Secretary of War, with previous papers, and inviting attention to the accompanying report of the Adjutant-General.

W. T. SHERMAN, *General.*

Report in case of proposed disposition of buildings at the abandoned posts of Forts Dodge and Wallace, Kansas.

Pursuant to instructions of the War Department, communicated in telegram of June 26, 1882, from this office to Lieutenant-General Sheridan, and by him repeated the next day to the department commander, General Pope, forwarded June 29, 1882, report of his chief quartermaster, setting forth that, as many of the buildings at Fort Dodge are built of stone and adobe, it is believed that if sold to be removed they will bring about $10,000; but if sold with the immediate ground upon which they stand, thus avoiding removal, it is believed that they would bring about $50,000; General Pope added that the ground upon which the buildings stand cannot be sold without an act of Congress.

July 10, 1882, the Lieutenant-General telegraphs that in view of the delay which is occurring in disposing of the public buildings at Forts Dodge and Wallace, he and General Pope recommended that the Secretary of War give authority to sell them to the highest bidder, after advertising for thirty days, in order to withdraw troops now watching them. (In this connection it is remarked that General Pope has recently recommended the appointment of Mr. James Langton as keeper at Fort Dodge, in which the Lieutenant-General concurred. Papers returned to War Department by General Sherman June 27, 1882.)

In connection with instructions of the Adjutant-General to prepare data upon which the Secretary of War can prepare a letter to Congress, recommending sale of lands on which the buildings at these two posts stand, with amount of land covered by the buildings, their location, size, &c., the following is respectfully submitted:

The disposition of the existing military reservations and posts of Forts Dodge and Wallace has already been recommended to the present Congress, with statement as to lands and buildings. (*Vide* Ex. Doc. H. R. No. 39, Forty-seventh Congress, first session, pp. 3, 6, 22, and 23.)

It does not appear from information in the Adjutant-General's Office what amount of land is occupied by the buildings at these posts, but they have the usual accomodations for three company posts, with stables, &c.

Attention is especially invited to the accompanying H. Ex. Doc. No. 195, Forty-seventh Congress, first session, showing action now pending in Congress respecting the Fort Dodge reservation, from which it appears that the Secretary of the Interior has recommended an amendment to the act of December 15, 1880, opening up to settlement that portion of the reservation north of the railroad right of way, for the reason that a portion of the reservation ordered sold is included in the Osage Indian trust lands (treaty, 1865). From an examination of the map appended to the document, it would appear that, with the exception of a portion in the northeast corner, the entire reservation of Dodge, now under military control, including the post buildings, is south of the north boundary of the trust lands and included therein.

Papers upon which the abandonment of these posts was authorized by the Secretary of War, and containing history, &c., are now in the Secretary's office, having been sent by the General of the Army, May 25, 1882, accompanying the Lieutenant-General's report of May 22, 1882, upon this subject and that of Texas posts.

Respectfully submitted,

R. C. DRUM,
Adjutant-General.

ADJUTANT-GENERAL'S OFFICE,
Washington, July 12, 1882.

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[House Ex. Doc. No. 195, Forty-seventh Congress, first session.]

Message from the President of the United States, transmitting a commmunication from the Secretary of the Interior relative to the disposal of the Fort Dodge military reservation in Kansas.

MAY 6, 1882.—Referred to the Committee on Military Affairs and ordered to be printed.

To the Senate and House of Representatives:

I transmit herewith a communication from the Secretary of the Interior of the 3d instant, with accompanying papers, in relation to a proposed amendment of the act of December 15, 1880, providing for the disposal of the Fort Dodge Military Reservation, Kansas.

The subject is commended to the consideration of Congress.

CHESTER A. ARTHUR.

EXECUTIVE MANSION, *May* 5, 1882.

DEPARTMENT OF THE INRERIOR,
Washington, May 3, 1882.

SIR: I have the honor to submit herewith for your consideration, and, if approved, for transmission to Congress, copy of letter (and accompanying maps and papers) addressed to the department on the 12th ultimo, by the Commissioner of Indian Affairs, in which he calls attention to the fact that there is a conflict between the second article of the treaty of 1865 with the Osage Indians (14 Stat., 688) and the act of December 15, 1880 (21 Stat., 311). The treaty provides for the sale of certain lands for the benefit of the Osage Indians; the act opens up the same lands to settlement under the homestead laws, thus depriving in a great measure the Indians of the proceeds that would arise from the sale of the lands. He has accordingly prepared draft of a bill to amend said act, so as to bring it into harmony with the provisions of the treaty. The bill meets the approval of the Commissioner of the General Land Office. It is important that the matter should receive prompt action.

Very respectfully,

H. M. TELLER,
Secretary.

The PRESIDENT.

DEPARTMENT OF THE INTERIOR,
OFFICE OF INDIAN AFFAIRS,
Washington, April 12, 1882.

SIR: By the act of Congress, approved December 15, 1880 (21 Stat., 311), the Secretary of the Interior was authorized to cause all that portion of the Fort Dodge military reservation, in the State of Kansas, lying north of the land owned and occupied by the Atchison, Topeka and Santa Fé Railroad Company, for right of way for its railroad, to be surveyed, sectionized, and subdivided as other public lands, and after said survey to offer said lands to actual settlers only, under and in accordance with the homestead laws of the United States, with the proviso that said railroad company shall have the right to purchase such portion of said reservation as it may need for its use adjoining that now owned by it, not exceeding 160 acres, by paying therefor the price at which the same may be appraised by the Secretary of the Interior.

The Fort Dodge military reservation was established June 22, 1868, as described and defined in general orders No. 17, headquarters Department of the Missouri, dated May 29, 1868, as indicated in green on the inclosed map.

By the second article of the treaty with the Osage Indians of 1865 (14 Stat., 688), said Indians ceded to the United States a tract of land 20 miles in width from north to south off the north side of the remainder of their reservation, and extending its entire length from east to west, which was to be held in trust for said Indians, to be surveyed and sold, and the proceeds placed in the Treasury to the credit of said Indians, &c. By the sixth article of said treaty it was stipulated that should the Indians agree to remove from the State of Kansas and settle in the Indian Territory, then their diminished reserve should be sold in the same manner and for the same purpose as provided in the second article in relation to the trust lands, 50 per cent. of the proceeds of the sale of the diminished reserve lands to be used in the purchase of a new home in the Indian Territory.

The northern boundary of the former cession is indicated in yellow on the map. It

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will be observed that a portion of the Fort Dodge military reservation lies south of that line. It will also be observed, by reference to the map, that of that portion of the line of the Atchison, Topeka and Santa Fé Railway which runs through the military reservation, the greater portion lies within the Osage trust lands.

The amendment to the second article of the aforesaid treaty fixes the prices at which these lands are to be disposed of at not less than $1.25 per acre. The act of July 15, 1870 (16 Stat., 362), fixes the same price at which they are to be sold. The act of 1872 (17 Stat., 90) provides for their disposition to actual settlers, in accordance with the general principles of the pre-emption laws, under which laws they cannot be disposed of at less than $1.25 per acre. The act of 1876 (19 Stat., 127) also fixes the price at $1.25 per acre.

As will be seen by reference to the inclosed copies of two letters from the Commissioner of the General Land Office, dated respectively 1st and 3d instant, and one from the register of the land office at Larned, Kans., dated March 25, 1882, the following dispositions under said act have been made of that portion of the lands embraced within the military reservation and lying within the Osage lands, viz:

1st. Cash entry No. 765, by the Atchison, Topeka and Santa Fé Railroad Company, being in sections numbered 25, 26, and 35, township 26 south, of range 25 west, and sections numbered 30 and 31, township 26 south, of range 24 west, as delineated by plat approved June 22, 1881, and containing 114.15 acres, at $5 per acre, as appraised under the act, amounting to $710.75. This entry, for reasons stated in the letter of the Commissioner of the General Land Office of the 3d instant, has not been approved for patent.

2d. Homestead entry No. 6595, by Daniel M. Frost, dated October 1, 1881, upon lots numbered 9, 10, 11, and 12, section 25, township 26 south, of range 25 west, and lots 14 and 15, section 30, township 25 south, of range 24 west, containing 88.65 acres.

3d. Frederick W. Boyd and Fred. T. M. Wenie, respectively, applied October 25 and November 17, 1881, to file a pre-emption declaratory statement embracing the last-named tracts. These applications were rejected by the local officers for the reason that they conflict with the homestead entry of Frost, which is of prior date, and are now before the Commissioner of the General Land Office on appeal.

Under the law as it now stands all the Osage lands within the military reservation lying north of the aforesaid railroad are now subject to entry under the homestead law, and the Indians receive nothing in consideration for their disposition.

To dispose of their lands in this manner is not only a very great injustice to them, but it is a violation of a solemn treaty stipulation and acts of Congress passed in pursuance thereof.

The act of 1880 should be so amended as to exclude the Osage trust lands, and, to remove all doubt as to the legality of the entry of the railroad company, a portion of which lies south of the line of its road, although I am of the opinion that under the act the company had a right to make its selections on either or both sides of its road, and of Mr. Frost's homestead entry, which is made in violation of the treaty, both entries should be confirmed by Congress, with the proviso that Mr. Frost shall pay into the Treasury of the United States, through the proper land office, $1.25 per acre, the price fixed by the treaty for the lands entered by him, the sum to be placed on the books of the Treasury to the credit of the Osage Indians, in accordance with the second article of the treaty of 1865: and with this end in view I have had prepared and submit herewith a draft of an amendment to the act of December 15, 1880, and with your approval I respectfully recommend that the same be transmitted to Congress with request for early action, the necessity for which is obvious.

I will add that the Commissioner of the General Land Office has been requested to take the necessary steps to have the sum paid by the railroad company for the lands selected by it placed to the credit of the Osage Indians.

Very respectfully, your obedient servant,

H. PRICE,
Commissioner.

The Hon. SECRETARY OF THE INTERIOR.

A BILL to amend an act entitled "An act to authorize the Secretary of the Interior to dispose of a part of the Fort Dodge military reservation to actual settlers under the provisions of the homestead laws, and for other purposes," approved December fifteenth, eighteen hundred and eighty.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the act entitled "An act to authorize the Secretary of the Interior to dispose of a part of the Fort Dodge military reservation to actual settlers under the provisions of the homestead laws, and for other purposes," approved December fifteenth, eighteen hundred and eighty, be, and the same hereby is, amended so as to read

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as follows, viz: That it shall be the duty of the Secretary of the Interior to cause all that portion of the Fort Dodge military reservation in the State of Kansas, lying north of the following described line, viz: Beginning where the west boundary line of the Fort Dodge military reservation intersects the north boundary line of the lands ceded to the United States, in trust, by the second article of the treaty with the Osage Nation of Indians, proclaimed the twenty-first day of January, eighteen hundred and sixty-seven; thence east along the north boundary line of the lands ceded as aforesaid to its intersection with the lands owned and occupied by the Atchison, Topeka and Santa Fé Railroad Company for right of way for its railroad; thence northeasterly along the lands of the said railroad company to the east boundary line of the Fort Dodge military reservation, to be surveyed, sectionized, and subdivided as other public lands, and after said survey to offer said lands to actual settlers only, under and in accordance with the homestead laws of the United States.

SEC. 2. *Be it further enacted*, That the following described entries, made under the provisions of the act to which this act is amendatory, upon the lands ceded to the United States, in trust, by the treaty with the Osage Indians, proclaimed the twenty-first day of January, eighteen hundred and sixty-seven, viz: Cash entry numbered seven hundred and sixty-five, by the Atchison, Topeka and Santa Fé Railroad Company, being and lying in sections numbered twenty-five, twenty-six, and thirty-five, in township twenty-six south of range twenty-five west, and sections numbered thirty and thirty-one, in township twenty-six south of range twenty-four west, as delineated by plat approved June twenty-two, eighteen hundred and eighty-one, containing one hundred and forty-two acres and fifteen one-hundredths of an acre; homestead entry numbered six thousand five hundred and ninety-five of Daniel M. Frost, bearing date the first day of October, eighteen hundred and eighty-one, and described as lots numbered nine, ten, eleven, and twelve, in section numbered twenty-five, in township twenty-six south of range twenty-five west, and lots numbered fourteen and fifteen in section numbered thirty, in township twenty-six south of range twenty-four west, containing eighty-eight acres and sixty-five one-hundredths of an acre, be, and the same are hereby, confirmed: *Provided*, That the said Daniel M. Frost shall pay into the Treasury of the United States, through the proper land office, the sum of one hundred and ten dollars and eighty-one cents, for the land so entered by him, being at the rate of one dollar and twenty-five cents per acre, the price fixed by the said treaty at which said lands were to be sold, which sum shall be placed on the books of the Treasury to the credit of the Osage Nation of Indians, in accordance with the provisions of the second article of the aforesaid treaty.

DEPARTMENT OF THE INTERIOR, GENERAL LAND OFFICE,
Washington, D. C., June 5, 1882.

SIR: I have the honor to submit the following statement and suggestion relative to the military reservation for old Fort Lyon on the Arkansas River in Colorado. This reservation was declared by an executive order dated August 8, 1863, which directed that a tract of land ten miles long from east to west and six miles wide from north to south with the flagstaff of Fort Lyon in the center, be reserved for said fort, with the understanding that so much of said land as was then embraced within the reservation of the Arapahoe and Cheyenne Indians should, when the government abandoned the military post, revert to said Indians. So much of the military reservation as was on the north side of the Arkansas River was then held by said Indians as a part of their reservation under article 1, treaty of February, 1861 (12 Stat., p. 1163). By article 2, treaty of October 14, 1865 (14 Stat., p. 704), said Indians relinquished their claim to said lands, except that by article 5 of the treaty certain selections were to be made for certain Indians named.

On September 1, 1868, there was declared by executive order another Fort Lyon military reservation, containing nine square miles and one hundred and fourteen acres, besides the islands in the Arkansas River along and in front of the reservation. Both these reservations were on land then unsurveyed; and from the language of the papers accompanying the last executive order it was supposed in this office that that order merely modified the limits of the reservation made by the first order by leaving out the lands on the south side of the river; whereas it now appears that the original Fort Lyon reservation was some 18 or 20 miles east of the new Fort Lyon reservation.

In 1873 and 1874 most of the lands embraced in the first reservation were subdivided as public lands (the military post having been previously abandoned), and the limits of reservation were not respected. Upon laying down the approximate limits of said reservation it is found that it covers parts of townships 22 and 23 south of ranges 47, 48, and 49 west of the sixth principal meridian. Owing to the fact that the lands were surveyed and returned as public lands, and that the attention of this office has but recently been called to the fact that they were comprised within the old Fort Lyon military res-

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ervation, several tracts have been disposed of as public lands, and in addition thereto certain Indian claims under article 5 of said treaty of October 14, 1865, have been located within, or partly within, said reservation limits, and patents have been issued accordingly. One of said Indian claims (No. 22) embraces the old improvements left by the military authorities in section 35, township 22 south, range 48 west.

In view of the act of Congress approved June 12, 1858 (11 Stat., p. 336), prohibiting the sale of useless and abandoned military reservations, said reservation of August 8, 1863, has been duly noted on the books of this office and no more disposals will be allowed until a law shall have been passed authorizing the same. The lands comprised within the reservation are, according to the field-notes of public surveys, only second and third rate grazing lands, except some first-rate lands along the river, and are not of a value sufficient to warrant the expense of disposing of them in any other way than the ordinary manner.

In order that the suspension now placed upon the lands may be removed and the lands be properly disposed of, I would suggest that if no objection is known to the War Department the matter be brought to the attention of Congress, with a recommendation that Congress provide for the disposal of the reservation as other public lands, providing, however, that the entries of those persons who have heretofore been allowed to enter lands within the reservation limits, as also the Indian claims located therein and patented, may be confirmed.

The foregoing is submitted in view of the fact that this office has no information to the effect that said reservation was ever relinquished to this Department by the War Department.

Very respectfully, your obedient servant,

N. C. McFARLAND,
Commissioner.

Hon. ROBERT T. LINCOLN,
Secretary of War.

[Senate Report No. 666, Forty-seventh Congress, first session.]

May 31, 1882.—Ordered to be printed.

Mr. COCKRELL, from the Committee on Military Affairs, submitted the following report to accompany bill S. 1293.

The Committee on Military Affairs, to whom was referred bill S. 1293, have duly considered the same, and submit the following report:

This bill provides for the sale of the Fort Wilkins military reservation, in the extreme northern portion of the Northern Peninsula of the State of Michigan. Your committee referred the bill to the Secretary of War for information, and received the following in reply:

WAR DEPARTMENT,
Washington City, May 12, 1882.

SIR: I have the honor to acknowledge the receipt of your letter of the 8th ultimo, transmitting bill S. 1293, providing for the sale of the Fort Wilkins military reservation, Michigan, and, in response to your request for certain information with regard to the same, to invite your attention to the inclosed report of the Adjutant-General, dated the 10th instant, to whom the subject was referred.

The property is no longer required for military purposes, and there is no objection on the part of this department to the passage of the bill.

Very respectfully, your obedient servant,

ROBERT T. LINCOLN,
Secretary of War.

Hon. F. M. COCKRELL,
Of Committee on Military Affairs, United States Senate.

HEADQUARTERS OF THE ARMY, ADJUTANT-GENERAL'S OFFICE,
Washington, May 10, 1882.

SIR: I have the honor to return herewith the communication of April 8, 1882, from Hon. F. M. Cockrell, of the Senate Committee on Military Affairs, who incloses for information, &c., S. 1293, Forty-seventh Congress, first session, "to provide for the dispo-

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sition of the Fort Wilkins military reservation, at Copper Harbor, in the State of Michigan," referred to this office for report, and to state as follows:

The post of Fort Wilkins was established May 28, 1844. It is located on Lake Superior, at Copper Mine Harbor, 10 miles from Keweenaw Point. The military reservation declared thereat by executive order dated August 19, 1853, embraces lots 2 and 3 of section 33 and lot 5 of section 34, township 59 north, range 28 west, Michigan, the area being about 320 acres.

The surface is reported as level and the soil as rocky and unproductive, the only productions being copper and an abundance of hard wood, which, however, is not of a desirable quality for building purposes. The climate is mild in summer, but in winter is liable to extremes of temperature, the average being 41° F. The locality is very healthy.

The post was abandoned in 1870, the troops having been withdrawn August 30 of that year, since which time it has been unoccupied for military purposes, the buildings at present being in charge of a keeper, Mr. William Frisise, of Copper Harbor, appointed by the Quartermaster's Department, his compensation consisting of free occupancy of one of the buildings.

The following is a list of the buildings at the post in 1870, taken from "Descriptions of Military Posts and Stations," published in 1872:

Three buildings, officers' quarters, containing seven sets, log and frame.

Two buildings, men's barracks, 65 by 21 feet; two kitchens, with mess-rooms, 28½ by 21 feet; log and frame.

Four buildings, 30 by 17½ feet, log and frame.

One two-story frame storehouse, 47 by 24 feet.

One log building used for storage, 30½ by 23¾ feet.

One one-story log and frame hospital, 33 by 22 feet.

One guard-house, log and frame, 25 by 31 feet.

One stable, log, 39 by 24 feet.

One bake-house, 24 by 19½ feet.

One magazine, stone, arched, 13½ by 13 feet.

One ice-house, 16 by 13½ feet.

The population of Keweenaw County, in which Fort Wilkins is situated, is, according to the last census, 4,270.

The nearest town is Copper Harbor, with a population (according to Rand & McNally's Atlas) of 75, and distant 1½ miles from the post.

Eagle River, about 25 miles distant, has (according to Rand & McNally) a population of 500.

The post being located on the extreme northern point of the Northern Peninsula of Michigan, the country surrounding it is not thickly settled.

In July, 1870, the commanding officer reported that "the garrison is completely isolated from the outside world from early in November until late in April, and sometimes until late in May, during which time navigation ceases, and then the only communication is by mail carried by men on snow-shoes." Since that date, however, as indicated by the latest railroad guides and maps, the railroad system has been extended to L'Anse, on the Keweenaw Bay, a distance of 60 miles from Fort Wilkins, and the post can be reached at all seasons by daily line of stages from L'Anse (or steamers when navigation is open) to the copper regions.

The military reservation of Fort Wilkins (with others) was reported to the present Congress as no longer desired for military purposes, with recommendation of the department that authority be granted to dispose of the same. (*Vide* H. Ex. Doc. No. 39, Forty-seventh Congress, first session; also bill H. R. 4322, identical with bill S. 1293.)

Upon reference to the department commander and the Quartermaster-General, no additional information has been obtained upon the subject of Senator Cockrell's communication.

I have the honor to be, sir, very respectfully, your obedient servant,

R. C. DRUM,
Adjutant-General.

Hon. SECRETARY OF WAR.

The following is the history and description given in H. Ex. Doc. No. 39, Forty-seventh Congress, first session, page 42:

FORT WILKINS, MICH.

Post established May 28, 1844.

Located on Lake Superior, at Copper Mine Harbor, 10 miles from Keweenaw Point.

Reservation declared by the President August 19, 1853, embracing lots 2 and 3 of section 33 and lot 5 of section 34, township 59 north, range 28 west, Michigan.

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Post directed to be discontinued by Special Order 90, Department of the Lakes, August 15, 1870, and troops withdrawn August 30, 1870.

The Secretary of War recommended to Congress relinquishment of the reservation in letter December 20, 1870, to House of Representatives, and in letter to same body dated March 5, 1874, he called attention to former letter, and recommended that authority be granted to dispose of the reserve. (*Vide* H. Ex. Doc. No. 176, Forty-third Congress, first session.)

In letter of May 25, 1874, the Secretary of War transmitted to the House of Representatives, for the information of the Committee on Military Affairs, in compliance with a request of said committee, a copy of report of General Hancock in regard to the quantity of land, and the value of buildings thereon, included in the reservation. The buildings are in charge of an agent appointed by the Quartermaster's Department. They are of log and frame, and not of any great value.

The reservation is wholly abandoned, and is not and will not be any longer needed for any military purposes, and nothing will be gained by maintaining it. Your committee recommend certain amendments to said bill, and, as so amended, recommend its passage.

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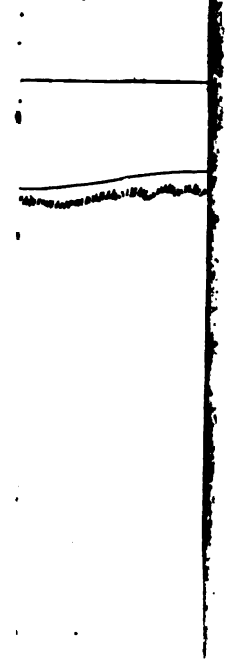

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47TH CONGRESS, 2d Session. | SENATE. | Ex. Doc. No. 21.

LETTER

FROM THE

SECRETARY OF THE INTERIOR,

TRANSMITTING,

In response to Senate resolutions of the 6th and 8th instant, a letter from the Commissioner of Pensions, giving, as far as practicable, a list of names of all persons borne on the pension rolls, and of all claimants for pensions, &c.

DECEMBER 20, 1882.—Referred to the Committee on Pensions and ordered to be printed.

DEPARTMENT OF THE INTERIOR,
Washington, December 19, 1882.

SIR: I have the honor to transmit herewith a letter from the Commissioner of Pensions, giving, so far as practicable at the present time, the information on the subject of pensions which was called for by the resolutions of the Senate passed on the 6th and 8th instant.

Very respectfully,

H. M. TELLER,
Secretary.

The PRESIDENT OF THE SENATE *pro tempore.*

DEPARTMENT OF THE INTERIOR,
PENSION OFFICE,
Washington, D. C., December 16, 1882.

SIR: I have the honor to acknowledge the receipt of Senate resolution dated December 6, and the amendment thereto, dated December 8, instant, calling for certain information on the subject of pensions, and submit herewith my report upon the same, so far as it is practicable to collate the matter at present.

First. The number of pensioners on the roll December 1, 1882, is estimated at 291,656, with an annual value of $30,013,000.

Second. The number of applications for pensions pending and the

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number on the rejected files December 1, instant, are shown by the several classes in the following table:

Class.	Applications pending.			Number on the rejected files.	Total number on the files.
	Original.	Increase.	Total.		
Army:					
Invalids	209,085	21,412	230,497	33,883	264,380
Widows, &c	62,326	233	62,559	34,661	87,220
Navy:					
Invalids	1,994	476	2,470	2,135	4,605
Widows, &c	311	2	313	1,319	1,632
War of 1812:					
Survivors	124		124	9,027	9,151
Widows	1,238		1,238	8,558	9,796
Total	275,078	22,123	297,201	79,583	376,784

To state the number of cases on the rejected files which may in the future be subject to a re-examination is so purely conjectural that I can only venture to give an opinion upon the subject.

Perhaps one-third of the whole number will again receive the consideration of the office upon additional testimony, but not more than 10 per cent. of this number, it is estimated, will, upon such reconsideration, receive favorable action.

In a large proportion of the whole number of rejected cases there will, as heretofore, be much correspondence.

The rule of practice now observed by the office is this:

No case should be rejected until every available source of information has been exhausted, unless the rejection be clearly upon legal points; and *no claim hereafter rejected will be reopened except upon new and material evidence going to the cause of rejection.* (Ruling of Commissioner of Pensions, October 3, 1881.)

Third. The persons who were entitled to the benefits of the arrears of pension acts of January 25 and March 3, 1879, may be divided into two classes, the first embracing those who were granted pensions prior to the date of the first-named act, and the commencement of whose pensions was governed by the limitation of the statutes then in force, and the second class, who had at the same date an application for pension pending, or who did, prior to July 1, 1880, apply for pension.

The amount paid for arrears to the first class is $24,728,155.50, and to the second class, $73,163,351.48; being a total disbursement for arrears from January 25, 1879, to December 1, 1882, of $97,891,506.98.

Fourth. To state the probable amount which may in the future be paid for arrears of pension, under the provisions of existing laws, is so problematical that it is with hesitation I make even an estimate. But in doing so I wish to append the information afforded by the records of the office, upon which I base an opinion.

Of the late war invalid-pension claims filed prior to July 1, 1876, 71 per cent. have already been allowed, and as 2.3 per cent. of the cases of this class admitted during the fiscal year just closed were filed during the period stated, it is fair to presume that the percentage of admissions will be still further increased. On this basis, especially for the reason that a large percentage of the widows' class have received favorable action, it would seem safe to assume that 80 per cent. of the late war invalid claims filed prior to July 1, 1880, will receive favorable action.

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There are now on the files 253,648 pending and rejected late war claims which were filed prior to July 1, 1880, and allowing 20 per cent. for rejection, there would be 202,919 for admission and entitled to the benefits of the arrears acts.

If these should be placed on the pension roll simultaneously, the amount of arrears on the present value of each case allowed would be, in the aggregate, in round numbers, $204,795,000.

On the same proposition, it would increase the present roll of pensioners from 291,656 to 494,575, and the annual value of the whole roll from $30,013,000 to (in round numbers) $50,000,000.

Fifth. The class of persons to be benefited by House bill 1410, now before the Senate, are those who have lost one hand, one arm, one foot, or one leg; also those who are now receiving a pension for a disability equivalent to any of those first named. The law now in force provides a pension to the several classes enumerated, as follows:

The loss of one hand or one foot, at the rate of $18 per month.

The amputation of an arm or a leg at or above the elbow or knee, at the rate of $24 per month.

For a disability which is equivalent to the loss of a hand or a foot, the rate of $18 per month.

Total inability to perform any manual labor, at the rate of $24 per month.

Total disability which requires the aid and attendance of another person, when the disability is not permanent in this degree, at the rate of $31.25 per month.

Loss of one hand *and* one foot, or totally disabled in the same, at the rate of $36 per month.

Amputation at the hip-joint, at the rate of $37.50 per month.

From an analysis of the pension roll of the ten accurately reported out of eighteen agencies, it is shown that 5.22 per cent. of the invalid pensioners borne thereon are in receipt of a pension for amputations described in the pending bill; also the number who are receiving such pension for the loss of a hand or an arm, or a foot or leg.

Applying this ratio to the whole number of invalid pensioners on the roll, it would show as follows:

For loss of hand or arm	$4,672
For loss of foot or leg	4,489
Total	9,161

In the reports before mentioned, received from the pension agents, four of them specify the surgical point of amputation, and accepting the same as a basis for a division of classes, the following statement will show an estimate of the whole number who come within the description of the bill so far as relates to amputation, giving the number who have lost one hand and who are now receiving $18 per month, those who have lost one arm and who are now receiving $24 per month, those who have lost one foot and who are now receiving $18 per month, and those who have lost one leg and are now receiving $24 per month, together with those who have lost one hand *and* one foot, and those who have amputation at the hip-joint, receiving $36 and $37.50 per month, respectively; also the proposed net monthly increase and the net annual increase for each class from their present rate to that of $40 per month:

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Loss of hand and now receiving $18 per month.	Loss of arm and now receiving $24 per month.	Loss of foot and now receiving $18 per month.	Loss of leg and now receiving $24 per month.	Loss of hand and foot and now receiving $36 per month.	Amputation at the hip joint, now receiving $37.50 per month.	Proposed net increase per month over the present rate.	Annual net increase between the present rate and that of $40 per month.
1,108	.....	.....	.....	.....	.....	$22 00	$292,512
.....	3,564	.....	.....	.....	.....	16 00	684,288
.....	.....	2,523	.....	.....	.....	22 00	666,072
.....	.....	.....	1,966	.....	.....	16 00	377,472
.....	.....	.....	.....	15	.....	4 00	720
.....	.....	.....	.....	.....	6	2 50	180
1,108	3,564	2,523	1,966	15	6	.....	2,021,244

There are, therefore, of this class (amputations) 9,182, with a total net annual increase, if House bill 1410 should become a law, allowing $40 per month, of $2,021,244.

This number will diminish from year to year, as it is rare that a new pension is now allowed for amputation.

EQUIVALENT DISABILITIES.

The following statement shows the number who are in receipt of a pension on account of disabilities equivalent to the amputations mentioned, and such others as may be affected by the bill in question; also the annual value of the increase, provided this class should be allowed $40 per month:

8,847 now receiving $18 per month, and the net increase will be	$2,335,608
1,552 now receiving $24 per month, and the net increase will be	297,984
232 now receiving $31.25 per month, and the net increase will be	21,576
14 now receiving $36 per month, and the net increase will be	672
280 are officers above the rank of first lieutenant, and the estimated net increase will be	60,480

In all 10,925, and a net annual increase of $2,716,320 for equivalent disabilities.

This estimate is to the close of the last fiscal year, and as the resolution calls for an estimate for the future as well, I separate those purely estimated from those compiled from the records. An examination of 20,000 original cases recently allowed shows that 2.7 per cent. of the same received a pension wherein the current rate was at and above $18 per month and less than $40 per month. This does not refer to amputations, as it is rare that a pension is now claimed for the same. Assuming that 30,000 claims of this class should be allowed during the current year, together with the increase allowed bringing others within the same description, the annual increase during the present year would be augmented by this class some $450,000, which, added to $2,716,320, would make a total increase for equivalent disabilities of $3,166,320.

Another proposition presented by the resolution is the probable number of pending cases which would be affected and added to the roll.

There were, July 1, 1882, 207,684 invalids claims' on file. Allowing 20 per cent. for rejection, there would remain 166,147 as likely to be admitted; deduct from this the 30,000 estimated for this year, which has entered into the former calculation, and there would remain 136,147. The same ratio of 2.7 per cent. for rates at and above $18 per month and less than $40 would give an estimated net increase in value under the provisions of this bill of $892,000.

The increase from lower rates up to those which would bring them within the same description would not vary very materially from the losses to the roll by death.

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Sixth. The number of pensioners on the roll June 30, 1882, who were receiving $8 per month and the fractional rating of $18 per month, with the present annual value, is as follows:

29,074 at $8 per month	$2,791,104
6,249 at $10 per month	749,880
9,209 at $12 per month	1,326,096
2,861 at $14 per month	480,648
1,104 at $16 per month	211,968
48,497	5,559,696

To increase these proportionately with the $18 and $24 class would bring the rates up to $15, $20, $25, $30, and $35 per month, as near as they could be equitably estimated. The net annual increase for these rates would be as follows:

29,074, now receiving $8 per month, to $15 per month	$2,442,216
6,249, now receiving $10 per month, to $20 per month	749,880
9,209, now receiving $12 per month, to $25 per month	1,436,604
2,861, now receiving $14 per month, to $30 per month	549,312
1,104, now receiving $16 per month, to $35 per month	251,712
This would increase the annual value of the roll	5,429,724

To estimate the number and amount involved on this scale of increase to pending cases which may be hereafter allowed involves more difficulties for a satisfactory estimate than those already made. I submit this, however, on the following basis:

Twenty-seven per cent. of those now on the roll are in receipt of the rates referred to. Take the 166,147 claimants before estimated as likely to be allowed a pension out of the pending claims now before the office, and the same rates would give 44,859 as likely to receive a pension of $8, and the intermediate grades of $10, $14, and $16 per month, and the annual net increase over the annual rates now provided by law would be $18,600,000.

Seventh. The number of pensioners on the roll for total deafness is 125 where such disability is not complicated with another for which pensioned. I am at present without data which enables me to make an estimate of those who are receiving a pension on account of partial deafness; also, for the same reason, to present an estimate for those who are pensioned for impaired vision less than total loss of sight.

I am unable to give figures showing the number who are actually granted an increase of their pension to $18 per month other than for loss of limb, but submit the statement that the death rate and increase from $18 to a higher rate will not very materially differ.

The resolution, in conclusion, calls for a list of names of all persons borne on the pension rolls, classified according to their post-office addresses by States and counties, the amounts paid annually to each, and the disability for which the pension was granted, giving the date when they were placed on the rolls. As the same provides that the other information called for shall not be delayed by reason of this latter requirement, I submit the report with that exception. I will add that this list of pensioners will be furnished with the least possible delay, and that arrangements are being made for its speedy collection.

I am, sir, very respectfully,

W. W. DUDLEY,
Commissioner of Pensions.

Hon. HENRY M. TELLER,
Secretary of the Interior.

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47TH CONGRESS, 2d Session. } SENATE. { Ex. DOC. No. 22.

LETTER

FROM

THE SECRETARY OF THE TREASURY,

TRANSMITTING,

In response to a provision of the "act making appropriations for sundry civil expenses of the government for the fiscal year ending June 30, 1882," a report in tabular form of the harbor, pilot, and other charges to which American and foreign vessels are subject under State laws, and the taxation upon ship-owners.

DECEMBER 20, 1882.—Referred to the Committee on Commerce and ordered to be printed.

TREASURY DEPARTMENT,
December 19, 1882.

SIR: I have the honor to transmit herewith, in response to a provision of the "act making appropriations for sundry civil expenses of the government for the fiscal year ending June 30, 1882, and for other purposes," approved March 3, 1881 (see Statutes of the third session of the Forty-sixth Congress, chap. 133, page 442), a report in tabular form of "the harbor, pilot, and other charges to which American and foreign vessels are subject under State laws, and the taxation upon ship-owners."

The tables set out the rates of pilotage in all the principal ports of the United States, as well as the wharf charges. The latter are not prescribed by State laws, but are levied by the owners of wharves and docks, and, as being a large item in the burdens of the shipping interest, are included in the tables.

Very respectfully,

CHAS. J. FOLGER,
Secretary.

Hon. DAVID DAVIS,
President pro tempore of the Senate.

Report showing the wharf charges at the principal ports of the United States to which American shipping is subject.

Albany, N. Y.—One cent per ton per day. Vessels lying in second tier pay half rates.

Annapolis, Md.—One and one-fourth cents per ton per day. Vessels of 5 tons, 10 cents per day; of 20 tons, 2 cents per ton per day; 40 tons, 1½ cents per ton per day; 50 tons and over, 1¼ cents per ton per day.

Astoria, Oreg.—Vessels of 800 tons and over, $5 per day. If loading or discharging cargo, no charges.

Barnstable, Mass.—Fishing vessels, 25 cents per day. Vessels of 100 tons or less, 50

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cents per day for forty days; after forty days, 25 cents per day. Vessels over 100 tons, 50 cents per day for sixty days, and after sixty days 25 cents per day.

Boston, Mass.—Vessels under 200 tons, three-fourths of a cent per ton per day; vessels over 200 tons, one-half cent per ton per day. Vessels loading or unloading allowed from five to forty-five days free of charge.

Bangor, Me.—Vessels from 100 to 300 tons, $3 to $4 per vessel while loading. Vessels over 300 tons pay from $1 to $3 per day.

Beaufort, S. C.—Vessels under 100 tons, 75 cents per day; over 100 and under 150 tons pay $1.25 per day; over 150 tons pay $1.50 per day. Vessels lying idle pay double rates per day. Line vessels and coastwise are exempt from foregoing rates.

Burlington, Iowa.—For each steamer landing at wharf, for first twenty-four hours, $2; each subsequent twenty-four hours, $1. Barges and wood-flats, 50 cents per day.

Brashear, La.—Vessels under 100 tons, 25 cents for first twelve hours, and 10 cents every day thereafter; from 100 to 500 tons, $2.50 for first twelve hours, and 50 cents every day thereafter; from 500 to 1,500 tons, $5 for first twelve hours, and $1 every day thereafter.

Bridgeport, Conn.—Vessels less than 150 tons, 50 cents per day; less than 250 tons, 75 cents per day; 250 tons and upwards, $1 per day

Bath, Me.—From 50 cents to $1 per day, according to size of vessel.

Baltimore, Md.—State charges are 1 cent per ton per day; private rates are $1 per day on vessels under 200 tons, and ranging up to $3.50 per day on vessels of 1,500 tons and over 200 tons.

Crisfield, Md.—One dollar per day for each vessel of 100 tons burden or under, and 1 cent per ton for each additional ton over 100 tons.

Castine, Me.—Twenty-five cents per tide of twelve hours; half rates for vessels under 20 tons.

Cincinnati, Ohio.—Two hours free. Over two hours and under twenty-four hours, $2.50; over twenty-four hours and under twelve days, 1½ cents per ton per day; over twelve days, 2 cents per ton per day.

Charleston, S. C.—Coastwise vessels free. Vessels engaged in the foreign trade, if under 100 tons, $1 per day; under 300 and over 100 tons, $2 per day; under 600 and over 300 tons, $2.50 per day; under 1,000 and over 600 tons, $3 per day; over 1,000 tons, $4 per day.

Cairo, Ill.—Two and one-fourth cents per ton per day, or less, and half rates for additional time. Boat remaining but six hours, a reduction of 25 per cent. upon these rates, but no boat to pay less than $5.

Eastport, Me.—Vessels 25 to 75 tons, 50 cents per day. Vessels 75 tons to 150 tons, $1 per day. Vessels above 150 tons, $2.

Edgartown, Mass.—Vessels of 50 tons, 25 cents per day; from 50 to 100 tons, 33 cents per day; from 100 to 150 tons, 50 cents per day; from 150 to 200 tons, 62 cents per day; from 200 to 300 tons, 75 cents per day; from 300 to 400 tons, $1 per day. Vessels upwards of 400 tons, in proportion.

Evansville, Ind.—Steamboats of less than 50 tons burden, for any period not over twenty-four hours, 75 cents; 50 tons burden and less than 75, $1; 75 tons and less than 100 tons burden, $1.50; 100 tons burden and less than 150, $2; 150 tons and less than 200 tons burden, $2.50; 200 tons burden and less than 250, $3; 250 tons and less than 300 tons burden, $3.50; 300 tons burden and less than 350, $4; 350 tons burden and less than 400 tons, $4.50; 400 tons burden and less than 450, $5; 450 tons and less than 500 tons, $5.50; 500 tons burden and less than 550 tons, $6; 550 tons and less than 600 tons burden, $6.50; 650 tons burden and less than 700, $7.50; 700 tons and less than 750 tons, $8; 750 tons and less than 800 tons burden, $8.50; 800 tons and over, $9. Every additional twenty-four hours, one-half rates.

Georgetown, D. C.—From $1 to $5 per day, according to size of vessel.

Gloucester, Mass.—Seventy-five cents per day for a vessel of about 100 tons.

Galveston, Tex.—Vessels of 50 tons and over not receiving or discharging cargo, 5 cents per ton; vessels under 50 tons, $2 per day. Loading or unloading cargo, pay nothing.

Key West, Fla.—One cent per ton per day.

Louisville, Ky.—Steamers for first twenty-four hours, $2; for each twenty-four hours or part thereafter, $1.

Memphis, Tenn.—Five cents per ton register for first six days, and 2 cents per ton for each twenty-four hours thereafter; if steamers make two or more trips per week, they pay half rates each trip.

Middletown, Conn.—One cent per ton per day.

Nashville, Tenn.—All steamers 150 feet long and upwards, $9; if 90 feet long and upwards, $4.50. All steamers less than 90 feet long, $2.

Natchez, Miss.—Three dollars per steamer, without regard to time or tonnage.

New York, N. Y.—Two cents per ton for the first 200 tons, and one-half cent per ton on each ton over 200 tons, per day.

New Haven, Conn.—One and one-eighth cents per ton on registered tonnage.

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New London, Conn.—Fifty cents per day.

New Orleans, La.—All vessels arriving from sea of 1,000 tons and under, 20 cents per ton; excess over 1,000 tons, 15 cents per ton. All steamboats pay, not over five days at wharf, 10 cents per ton each day; after five days, $5 per day.

New Bedford, Mass.—Three cents per 10 tons per day; half rates between December 1 and April 1 if vessel is idle.

Nantucket, Mass.—Three mills per ton per day.

Newburyport, Mass.—Vessels under 50 tons, 50 cents per day; vessels from 50 to 100 tons, $1 per day; from 100 to 150 tons, $1.25 per day; from 150 to 200 tons, $1.25 per day; from 200 to 250 tons, $1.75 per day; from 250 to 300 tons, $2 per day.

Norfolk, Va.—Steamers, 1 cent per ton per day; sailing vessels, 1 cent per ton per day for first 300 tons, and one-half cent per ton on each additional ton.

Portland, Me.—Twenty-five cents per 100 tons register per day. No charge if vessel be loading or unloading.

Portsmouth, N. H.—Vessels under 50 tons, 20 cents per day; between 50 and 100 tons, 30 cents per day; between 100 tons and 150 tons, 40 cents per day; between 150 and 200 tons, 50 cents per day; and 10 cents additional for every 50 tons above 200 tons.

Plymouth, Mass.—Twenty-five cents per day in summer, and half rates in winter. If lading or discharging cargo, no charge is made.

Port Townsend, Wash.—Small vessels, $3 per month; other vessels not discharging or receiving cargo, $2 per day.

Providence, R. I.—Vessels under 50 tons, 25 cents per day; over 50 tons, one-half cent per ton per day.

Philadelphia, Pa.—Sailing vessels, $4 to $6 per day; steamers, $15 per day.

San Francisco, Cal.—Vessels under 50 tons, 50 cents per day; over 50 and under 500 tons, average of $4 per day; over 500 tons and under 1,000 tons, average $10 per day; over 1,000 and under 2,000 tons, average $17.50 per day; over 2,000 tons and under 2,500 tons, $24.25 per day; over 2,500 tons, 50 cents for each additional 100 tons.

Stonington, Conn.—Vessels of 50 tons and under, 25 cents per day; over 50 tons, one-half cent per ton per day.

Saint Louis, Mo.—Three cents per ton every time the vessel makes fast to the wharf, if owned in Saint Louis; if owned elsewhere, 5 cents per ton.

Savannah, Ga.—Vessels under 100 tons, employed, 50 cents per day; under 100 tons, not employed, $1 per day; over 100 tons, employed, 75 cents per day; over 100 tons, not employed, $1.50 per day.

Salem, Mass.—Vessels under 50 tons, 20 cents per day; from 50 to 150 tons, 30 cents per day; from 150 to 300 tons, 40 cents per day; from 300 to 450 tons, 50 cents per day; upwards of 450 tons, 60 cents per day.

San Diego, Cal.—From $2 to $5 per day.

Vicksburg, Miss.—All vessels 300 tons and over, $5 for six days or less; on barges, &c., $1 per day.

Wheeling, W. Va.—Steamers: 100 tons burden, $1.50 for first twenty-four hours; 100 tons, and less than 200, $2.50 for first twenty-four hours; 200 tons, and less than 300, $3 for first twenty-four hours; 300 tons, and less than 400, $3.50 for first twenty-four hours; 400 tons and upwards, $4.50 for first twenty-four hours. Half rates for each subsequent twenty-four hours.

Wilmington, N. C.—Vessels under 100 tons, $2 per day; from 100 to 200 tons, $3 per day; over 200 tons, $5 per day. Vessels occupying second, third, and fourth tiers pay half rates.

Wilmington, Del.—Vessels 60 tons and less, $1.50 per day; over 60 tons, $2.25 per day.

Wiscasset, Me.—Vessels 50 to 100 tons register, 25 cents per day; 100 to 200 tons, 50 cents per day; 200 to 400 tons, 75 cents per day; 400 to 700 tons, $1 per day; 700 to 1,000 tons, $1.50 per day; 1,000 tons and upwards, $2 per day.

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Report showing the harbor, pilot, and other charges at the principal ports of the United States to which American shipping are subject under State laws, as called for by Senate resolution of March 3, 1881.

Port.	Portage.	Compulsory pilotage.	Harbor master.	Quarantine.	State taxes.	Remarks.
Baltimore	Vessels drawing 15 feet and over, $5 per foot; vessels drawing 12 feet and less than 15 feet, $4 per foot; vessels drawing less than 12 feet, $3.50 per foot.	All vessels under register are compelled to pay pilotage.		Vessels from foreign port pay a fee of one cent per ton from May 1 to November 1.	As on other personal property.	All vessels over 100 tons navigating the Chesapeake Bay are compelled to take out a pilot's license, for which a charge of 10 cents per ton is exacted.
Boston	Vessels pay for inward pilotage an average of $4.58 per foot draft, and for outward pilotage an average of $3.32 per foot draft of vessel.	All vessels engaged in foreign trade are obliged to pay full pilotage if spoken; vessels under 200 tons register liable to half rates.			Income of vessel property taxed only.	
Brownsville	Vessels pay $4 per foot, actual draft of vessel, for both inward and outward pilotage.	Obliged to pay $2 per foot draft, pilot employed or not.				
Charleston, S. C	Vessels of 6 feet draft pay $15; 7 feet draft, $16.50; 8 feet draft, 18.50; 9 feet draft, $21; 10 feet draft, $28.50; 11 feet draft, $33; 12 feet draft, $40; 12½ feet draft, $44; 13 feet draft, $45; 13½ feet draft, $50; 14 feet draft, $54; 14½ feet draft, $60; 15 feet draft, $66; 15½ feet draft, $69; 16 feet draft, $84; 16½ feet draft, $100; 17 feet draft, $120; 17½ feet draft, $150; 18 feet draft, $180.	Vessels obliged to pay full rates if pilot be employed or not.			As on other personal property.	
Detroit					Same as on other personal property.	For passing through Portage Lake and Lake Superior Canal, for all vessels drawing 5 feet or more, going through the lower branch of this canal (from Lake Superior to Portage Lake) and return, 2 cents per ton; all vessels through upper branch of canal (between Portage Lake and Lake Superior), one way, 2 cents per ton; both ways, 3 cents per ton; passing through both branches and return, 4 cent per ton. No charges for vessels [illegible]

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Fernandina	Vessels going onward or outward, drawing 6 feet of water and under, $12; over 6 feet and not over 10 feet, $3 per foot; over 10 feet and not over 14 feet, $4 per foot; over 14 feet, $5 per foot.	Vessels obliged to pay full rates, pilot employed or not.	Vessels pay 4 cents per running foot on entry and clearance of vessel.		As on all other personal property.
Galveston	$4 per foot for actual draft for both inward and outward pilotage.	$2 per foot actual draft, if pilot be not employed.			
Gloucester	Vessels pay an average of $3.25 per foot draft for both inward and outward pilotage.	All vessels, if over 200 tons burden, if spoken, pay full rates; if under 200 tons, half rates.			As on other personal property.
Jacksonville	$3 per foot actual draft for both inward and outward pilotage.	One-half of regular rates are allowed if pilot offers his services and they are declined.	Vessels not owned in the State of Florida pay $100 to the State and $50 to Duvall County, for doing passenger or freight business in Jacksonville.		4½ per cent. on assessed value.
Mobile			3 cents per ton of register of vessel.		
New Bedford	$2.25 per foot draft of vessel under certain contingence.	Vessels drawing less than 7 feet are exempt from pilotage; vessels refusing to take a pilot pay half rates.			As on other personal property.
New London	$2 per foot draft of vessel between March 20 and September 20, and $2.40 per foot between September 20 and March 20.	On all vessels in foreign trade drawing 9 feet of water and over, if spoken.	$3 per day for time occupied in his duties.		As on other personal property.
New Orleans	Bar pilotage, $4.50 per foot draft of vessel; river pilotage, from bar to city, $40; same from city to bar.	None fixed by law		$20 for large vessels, and $10 to $15 for smaller ones.	
Newport	Vessels of 10 feet draft and under, $1 per foot; of 10½ feet draft to 12 feet draft, $1.50 per foot; of 12½ feet draft to 15 feet draft, $2 per foot; of 15½ feet to 20 feet draft, $2.50 per foot; of 20½ feet draft and over, $3 per foot; winter rates from November 1 to May 1, 50 cents per foot additional.	Vessels spoken by a pilot out pay half pilotage.		No State tax on vessels.	

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Report showing the harbor, pilot, and other charges at the principal ports of the United States, &c.—Continued.

Port.	Portage.	Compulsory pilotage.	Harbor master.	Quarantine.	State taxes.	Remarks.
New York	Vessels pay between April 1 and November 1 at the average rate of $6.37 per foot draft of vessel for inward pilotage, and $3.72 per foot for outward pilotage, and between November 1 and April 1, $6.78 per foot for inward and $3.73 for outward pilotage.	On all registered vessels of United States at full rates.	No compulsory fees.	Fee of $6.50 paid health officer on arrival from foreign port.		
Norfolk	Pilot to sea from port vessels drawing less than 12 feet, $4.65 per foot draft; vessels drawing 12 feet and less than 16 feet, $6; vessels drawing 16 feet and less than 18 feet, $7.35; vessels drawing 18 feet and over, $8.65.	Vessels pay full rates if pilot be employed or not.	Vessels engaged in coasting trade pay $3 on each entry; engaged in foreign trade, $3 to $5 on each entry.	All vessels from foreign ports for examination, $8.	2½ per cent. as personal property.	
Pensacola	Vessels pay at average rate of $4 per foot draft of vessel.	Pilotage compulsory at full rates.	Vessels of less than 10 feet draft, $5, and more than 10 feet, $1 for each additional foot, excepting vessels regularly employed in trade between Pensacola and the ports of Alabama, Louisiana, and Texas.		Same as on other personal property.	
Perth Amboy	Inward pilotage to sea, $3.75 per foot draft up to 14 feet; $4.50 per foot draft from 14 to 18 feet; $5.50 per foot draft from 18 to 21 feet up. Outward pilotage to sea, $2.70 per foot up to 14 feet draft; $3.10 per foot from 14 to 18 feet draft; $4.10 per foot from 18 to 21 feet draft; $4.75 per foot from 21 and over, and $4 additional from November 1 to April 1.	Full pilotage if under register and spoken.				
Philadelphia	Vessels for inward pilotage pay at an average of $4 per foot draft of vessel, and for outward pilotage $3 per foot draft.					
Portland, Me	Where no agreement is made, the rate is $2 per foot draft of vessel.	Pilotage not compulsory.			As on other personal property.	

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Portland, Oreg.....	$4 per foot draft of vessel each way	$2 per foot draft of vessel each way if spoken.	.....	.....	3 per cent. upon assessed value.	Tonnage from sea to port and return $4.50 on vessel of 1,000 tons.
Portsmouth.....	$2.50 per foot up to 25 feet draft...	Pilotage not compulsory.	.....	.....	As on all other personal property.	
San Diego.....	All vessels under 500 tons burden $5 per foot draft; all vessels over 500 tons burden $5 per foot draft, and 4 cents per ton registered measurement; vessels engaged in fishing trades $1 per foot draft.	Vessels spoken and pilot declined, one half of full rates. Vessels engaged in coasting trade exempt from pilotage.	.....	.....	As on other property.	
San Francisco	All vessels under 500 tons, $5 per foot draft; all vessels over 500 tons, $5 per foot draft, and 4 cents per ton on registered measurement.	Vessels in foreign trade spoken and pilot declined pay half rates.	.....	.....	.....	
Savannah	Average rate, $5.50 per foot draft of vessel.	Pilotage not compulsory.	.....	.....	.....	
Shieldsborough	$3 per foot actual draft of vessel ..	$3 per foot draft	.....	.....	.....	
Wilmington, Del ..	Vessels drawing not over 12 feet of water, $3 per foot; over 12 feet and not over 15 feet, $4.16 per foot; over 15 feet and not over 18 feet, $4.50 per foot; over 18 feet and not over 25 feet, $5 per foot; over 25 feet, $5.50 per foot; and $10 additional between November 1 and April 1.	All vessels in foreign trade have to pay full rates.	.....	$10 for examining a vessel from an infected port.	.....	
Wilmington, N. C..	About an average of $5.50 per foot draft of vessel.	Full rates if spoken...	Payment of fee of $3 on arrival; vessel may command services of harbor master at any time while vessel is in port.	.....	As on other personal property.	

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47TH CONGRESS, 2d Session. | SENATE. | Ex. Doc. No. 23.

LETTER

FROM THE

SECRETARY OF THE INTERIOR,

TRANSMITTING,

In response to Senate resolution of August 2, 1882, a tabulated statement showing the number of public documents printed by order of Forty-fifth, Forty-sixth, and Forty-seventh Congresses.

DECEMBER 23, 1882.—Ordered to lie on the table and be printed.

DEPARTMENT OF THE INTERIOR,
Washington, December 22, 1882.

SIR: In compliance with a resolution of the Senate, adopted August 2, 1882, I have the honor to transmit herewith—

A tabulated statement showing the number of public documents printed by order of the Forty-fifth, Forty-sixth, and Forty-seventh Congresses, and the number of public documents appertaining to said Congresses printed in compliance with provisions of previously existing statutes, and the distribution directed to be made of the same, and cost thereof.

It has not been found practicable to give, in all cases, exact information regarding the cost of documents. The amount of same, so far as stated, has been collated from the Annual Reports of the Public Printer, or furnished directly by that officer.

Additional items of information are embraced in foot-notes, which, it is thought, will be of interest and service to Senators and Representatives.

Very respectfully,

H. M. TELLER,
Secretary.

Hon. DAVID DAVIS,
President pro tempore United States Senate.

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TABULATED STATEMENT

OF THE

DOCUMENTS

OF THE

FORTY-FIFTH AND FORTY-SIXTH CONGRESSES, AND OF THE FORTY-SEVENTH CONGRESS, FIRST SESSION.

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TABLE A.—*DOCUMENTS OF THE FORTY-FIFTH CONGRESS.*

[Printed in compliance with provisions of prior laws.]

Volume.	Title.	Total number ordered.	Usual number.*	Ordered for the Senate.	To each Senator.	Surplus.	Ordered for the House.	To each Representative.	Surplus.	Department or office.	Number of copies.	By what authority printed.	Cost.
	FIRST SESSION, SENATE.												
	Journal	3,450	1,900							Interior Department	1,550	Secs. 3792, 3798 R. S. *a*, *b*	*c*$1,717 79
	FIRST SESSION, HOUSE.												
	Journal	3,450	1,900							do	1,550	Secs. 3792, 3798 R. S. *a*, *b*	*c*2,150 40
	Executive documents.												
	Nos. 1 to 21, except 5, which is found in vol. 13, second session.	1,900	1,900									Sec. 3792 R. S	(*d*)
	Miscellaneous documents.												
1	Nos. 1 to 20, except 6, 7, 8, 10, 11, 16	1,900	1,900									Sec. 3792 R. S.	(*d*)
	Contested elections:												
2	Dean *vs.* Field, and Richardson *vs.* Rainey.	1,900	1,900									do	(*d*)
3	Haralson *vs.* Shelley, and Tillman *vs.* Smalls.	1,900	1,900									do	(*d*)
4	Finley *vs.* Bisbee	1,900	1,900									do	(*d*)
5	Nutting *vs.* Reilly	1,900	1,900									do	(*d*)
	SECOND SESSION, SENATE.												
	Journal	3,450	1,900							Interior Department	1,550	Secs. 3792 and 3798 R. S.	*c*94,491 08
	Executive documents.												
1	Nos. 1 to 9, except 3 and 4, first session, and 1 to 35, except 12, second session.	1,900	1,900									Sec. 3792 R. S	(*d*)
2	Nos. 36 to 100, except 60 and 84	1,900	1,900									do	(*d*)
3	Nos. 3 first session, No. 1 first session, and [illegible] second session	1,900	1,900									do	(*d*)

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4	Report United States Coast Survey, 1877.	1,900	1,900									do	(d)
5	Bridging the Mississippi River	1,900	1,900									do	(d)
	Miscellaneous documents.												
1	Nos. 1 to 15, first session, and 1 to 35, second session.	1,900	1,900									Sec. 3792 R. S	(d)
2	Nos. 36 to 89, except 49 and 50	1,900	1,900									do	(d)
3	Report of Commissioner of Fish and Fisheries. 1877.	1,900	1,900									do	(d)
4	Arguments before Committee on Patents.	1,900	1,900									do	(d)
	Reports of committees.												
1	Nos. 1 to 25, Part 1, first session, and 25, Part 2, to 209, second session.	1,900	1,900									Sec. 3792 R. S	(d)
2	Nos. 210 to 512	1,900	1,900									do	(d)
3	Nos. 513 to 546	1,900	1,900									do	(d)
	SECOND SESSION, HOUSE.												
	Journal	3,450	1,900							Interior Department	1,550	Secs. 3792 and 3798 R. S	*a*8, 141 12
	Executive documents.												
1	Foreign Relations, United States, 1877	7,900	1,900	2,000	25	50	4,000	13	61			Secs. 3792 and 3798 R. S	*c*6, 884 77
2	Report of Secretary of War, 1877	4,900	1,900	1,000	12	64	2,000	6	182			do do	*c*5, 205 50
3	Engineer's, Part 1	4,900	1,900	1,000	12	64	2,000	6	182			do do	*c*5, 630 04
4	Engineer's, Part 2	4,900	1,900	1,000	12	64	2,000	6	182			do do	*c*4, 079 78
5	Ordnance	4,900	1,900	1,000	12	64	2,000	6	182			do do	*c*6, 061 09
6	Signal Office	4,900	1,900	1,000	12	64	2,000	6	182			do do	*c*5, 834 10
7	Reports Secretary of Navy and Postmaster-General, 1877.	4,900	1,900	1,000	12	64	2,000	6	182			do do	*c*4, 658 10
8	Report Secretary of Interior, 1877:	4,900	1,900	1,000	12	64	2,000	6	182			do	*c*5, 538 17
9	Education	4,900	1,900	1,000	12	64	2,000	6	182			do	*e*19, 947 00
10	No. 1, Parts 6, 7, 9, and Nos. 7 to 33	1,900	1,900									Sec. 3792 R. S	(d)
11	Report of Secretary of the Treasury, 1877.	4,900	1,900	1,000	12	64	2,000	6	182			Secs. 3792 and 3798 R. S	*c*4, 376 13
12	Reports Comptroller of Currency and Commissioner of Internal Revenue, 1877.	1,900	1,900									Sec. 3792 R. S	*c*7, 461 58
13	No. 5, first session, and Nos. 6, 61, and 73, second session.	1,900	1,900									do	(d)
14	Nos. 34 to 72, except 35, 39, 51, and 61	1,900	1,900									do	(d)
15	Receipts and expenditures, 72-3, 73-4	1,900	1,900									do	(d)
16	Mail contracts	1,900	1,900									do	(d)
17	Nos. 74 to 101, except 89 and 90	1,900	1,900									do	(d)

* See note on distribution of "usual number," page 10.

a The "usual number" was subsequently increased to 1,900.

b Only 1,670 copies of the Senate and 1,610 of the House Journal are reported by the Public Printer as printed under the provisions of this section and subsequent increase.

c The cost of binding the "reserved copies" is not included in this sum.

d As only the aggregate cost of documents of which only the "usual number" is printed is given in the Reports of the Public Printer, it is impossible to state the cost of this individual volume.

e The cost of special edition of 25,000 copies is included in this sum.

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TABLE A.—*DOCUMENTS OF THE FORTY-FIFTH CONGRESS*—Continued.

Volume.	Title.	Total number ordered.	Usual number.*	Ordered for the Senate.	To each Senator.	Surplus.	Ordered for the House.	To each Representative.	Surplus.	Department or office.	Number of copies.	By what authority printed.	Cost.
	Fishery Awards:												
18	Part 1	1,900	1,900									Sec. 3792 R. S	(a)
19	Part 2	1,900	1,900									do	(a)
20	Part 3	1,900	1,900									do	(a)
21	Commerce and Navigation, 1877	10,050	1,900	2,000	25	50	6,150	20	90			Secs. 3792 and 3798 R. S	b$11,866 64
22	Commercial Relations, 1877	6,900	1,900	2,000	25	50	3,000	9	273			do do	b7,253 92
	Report of Attorney-General, 1877	4,900	1,900	1,000	12	64	2,000	6	182			do do	c845 05
	Miscellaneous documents.												
1	Nos. 1 to 35, except 31	1,900	1,900									Sec. 3792 R. S	(a)
	Expenditures in the State Department.	1,900	1,900									do	(a)
3	Nos. 36 to 50	1,900	1,900									do	(a)
4	Nos. 51 to 56, except 52	1,900	1,900									do	(a)
5	No. 52, Election Cases, House of Representatives, 1871 to 1876.	1,900	1,900									do	(a)
6	Nos. 57 to 66, except 63	1,900	1,900									do	(a)
7	Testimony regarding administration of Navy Department.	1,900	1,900									do	(a)
	Reports of committees.												
1	Nos. 1 to 4, first session, and 1 to 245, second session.	1,900	1,900									Sec. 3792 R. S	(a)
2	Nos. 246 to 588	1,900	1,900									do	(a)
3	Nos. 589 to 701	1,900	1,900									do	(a)
4	Nos. 702 to 833	1,900	1,900									do	(a)
5	Nos. 834 to 1017	1,900	1,900									do	(a)
	THIRD SESSION, SENATE.												
	Journal	3,450	1,900							Interior Department	1,550	Secs. 3792 and 3798 R. S	3,185 89
	Executive documents.												
1	Nos. 1 to 48, except 13 and 27	1,900	1,900									Sec. 3792 R. S	(a)
2	Report United States Coast Survey, 1876, and Survey of Panama, &c. [illegible]	1,900	1,900									do	(a)

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3	Hall's Second Arctic Expedition	1,900	1,900									Sec. 3792 R. S.	(a)
4	Nos. 49 to 74, except 58	1,900	1,900									do	(a)
5	International Monetary Conference at Paris	1,900	1,900									do	(a)
	Miscellaneous documents.												
1	Nos. 1 to 30, except 31, 53, and 59	1,900	1,900									Sec. 3792 R. S.	(a)
2	Report of Commissioner of Fish and Fisheries, 1878.	1,900	1,900									do	(a)
												do	(a)
3	Transfer of Indian Bureau to War Department, and Report of Smithsonian Institution, 1878.	1,900	1,900									do	(a)
4	Private Land Claims, Parts 1, 2, and 3.	1,900	1,900									do	(a)
	Reports of committees.												
1	Nos. 547 to 693	1,900	1,900									Sec. 3792 R. S	(a)
2	Nos. 694 to 869, except 744 and 855	1,900	1,900									do	(a)
3	Affairs in the Indian Territory (Patterson),	1,900	1,900									do	(a)
4	Alleged frauds and violence in election of 1878.	1,900	1,900									do	(a)
	THIRD SESSION, HOUSE.												
	Journal	3,450	1,900							Interior Department	1,550	Secs. 3792 and 3798 R. S	b94, 131 92
	Executive documents.												
1	Foreign Relations of the United States, 1878.	7,900	1,900	2,000	25	50	4,000	13	61			Secs. 3792 and 3798 R. S	b5, 846 09
2	Report of Secretary of War, 1878	4,900	1,900	1,000	12	64	2,000	6	182			do do	b3, 924 11
3	Engineers, Part 1	4,900	1,900	1,000	12	64	2,000	6	182			do do	b9, 133 41
4	Engineers, Part 2	4,900	1,900	1,000	12	64	2,000	6	182			do do	b4, 040 16
5	Engineers, Part 3	4,900	1,900	1,000	12	64	2,000	6	182			do do	b4, 190 30
6	Ordnance	4,900	1,900	1,000	12	64	2,000	6	182			do do	b5, 158 64
7	Signal Office	4,900	1,900	1,000	12	64	2,000	6	182			do do	b6, 504 86
8	Reports of Secretary of Navy and Postmaster-General, 1878.	4,900	1,900	1,000	12	64	2,000	6	182			do do	b5, 672 81
9	Report of Secretary of Interior, 1878.	4,900	1,900	1,000	12	64	2,000	6	182			do do	a7, 623 89
10	Education	4,900	1,900	1,000	12	64	2,000	6	182			do do	a5, 805 58
11	No. 1, Parts 6 and 7, and Nos. 7 to 31.	1,900	1,900									Sec. 3792 R. S	(b)
12	Report of Secretary of the Treasury, 1878.	4,900	1,900	1,000	12	64	2,000	6	182			Secs. 3792 and 3798 R. S	a4, 413 38
13	Reports of Comptroller of the Currency and Commissioner of Internal Revenue, 1878.	1,900	1,900									Sec. 3792 R. S	(b)
14	Estimates of Appropriations, Indian disbursements: Report Commissioner of Patents, 1878.	1,900	1,900									do	(b)

*See note on distribution of "usual number," page 10.

a As only the aggregate cost of documnts of which only the "usual number" is printed is given in the Reports of the Public Printer, it is impossible to state the cost of this individual volume.

b The cost of binding the "reserved copies" is not included in this sum.

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TABLE A.—*DOCUMENTS OF THE FORTY-FIFTH CONGRESS*—Continued.

Volume.	Title.	Total number ordered.	Usual number.*	Ordered for the Senate.	To each Senator.	Surplus.	Ordered for the House.	To each Representative.	Surplus.	Department or office.	Number of copies.	By what authority printed.	Cost.
15	Foreign Commerce, 1878	10,050	1,900	2,000	25	50	6,150	20	90			Secs. 3792 and 3798 R. S	a$14,979 68
16	Internal Commerce, 1878	10,050	1,900	2,000	25	50	6,150	20	90			do do	a5,186 68
17	Nos. 33 to 107, except 48 and 88	1,900	1,900									Sec. 3792 R. S	(b)
18	Mail contracts	1,900	1,900									do	(b)
19	Commercial relations of the United States, 1878.	6,900	1,900	2,000	25	50	3,000	9	273			Secs. 3792 and 3798 R. S	8,324 42
	Report of Attorney-General, 1878	4,900	1,900	1,000	12	64	2,000	6	182			do	a902 16
	Miscellaneous documents.												
1	Nos. 1 to 21	1,900	1,900									Sec. 3792 R. S	(b)
2	Investigation of Judge H. W. Blodgett and Hon. Jno. I. Davenport.	1,900	1,900									do	(b)
3	Nos. 24 to 34, except 31	1,900	1,900									do	(b)
	Presidential election, investigation:												
4	Part 1	1,900	1,900									do	(b)
5	Part 2	1,900	1,900									do	(b)
	Reports of committees.												
1	Nos. 1018, second session and 1 to 168, except 119, third session.	1,900	1,900									Sec. 3792 R. S	(b)
2	Nos. 119 and 169 to 291	1,900	1,900									do	(b)
	MISCELLANEOUS PUBLICATIONS.												
	Congressional Directory, first session.	13,000		1,596	21		6,321	21		Committee on Printing for official distribution.	5,083	Secs. 77 and 3801 R. S	$1,654 55
	Congressional Directory, second session:												
	First edition	13,000		1,596	21		6,321	21		do	5,083	do do	1,378 35
	Second edition	13,000		1,596	21		6,321	21		do	5,083	do do	1,368 25
	Third edition	12,000		1,596	21		6,321	21		do	4,083	do do	1,235 15
	Congressional Directory, third session:												
	First edition	11,500		1,596	21		6,321	21		do	3,583	do do	1,265 53
	Second edition	12,000		1,596	21		6,321	21		do	4,083	do do	1,300 66

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Congressional Record:												
Special and first session	10,350	.....	3,100	39	58	7,250	23	281	.....	.....	Con. res., June 4, 1874	(c)
Second session, Part 1	10,350	.....	3,100	39	58	7,250	23	281	.....	.....	do	(c)
Second session, Part 2	10,350	.....	3,100	39	58	7,250	23	281	.....	.....	do	(c)
Second session, Part 3	10,350	.....	3,100	39	58	7,250	23	281	.....	.....	do	(c)
Second session, Part 4	10,350	.....	3,100	39	58	7,250	23	281	.....	.....	do	(c)
Second session, Part 5	10,350	.....	3,100	39	58	7,250	23	281	.....	.....	do	(c)
Index	10,350	.....	3,100	39	58	7,250	23	281	.....	.....	do	(c)
Third session, Part 1	10,350	.....	3,100	39	58	7,250	23	281	.....	.....	do	(c)
Third session, Part 2	10,350	.....	3,100	39	58	7,250	23	281	.....	.....	do	(c)
Third session, Part 3	10,350	.....	3,100	39	58	7,250	23	281	.....	.....	do	(c)
Index	10,350	.....	3,100	39	58	7,250	23	281	.....	.....	do	(c)
Abridgment of Messages and Documents:												
Second session	35,000	.....	10,000	128	16	25,000	82	154	.....	.....	Sec. 3798 R. S	$25,410 56
Third session	35,000	.....	10,000	128	16	25,000	82	154	.....	.....	do	20,402 85
Pamphlet Laws:												
First session	26,632	.....	3,000	38	36	10,000	33	1	State Department	13,632	Sec. 3807 R. S. and act of June 20, 1874.	3,014 32
Second session	26,632	.....	3,000	38	36	10,000	33	1	do	13,632	do	14,922 95
Third session	26,632	.....	3,000	38	36	10,000	33	1	do	13,632	do	14,396 16
Statutes at Large, vol. 20	3,000	.....	76	1	.....	301	1	.....	State Department, for government use. For sale	2,031 593	Act of June 20, 1874.	6,579 50
Opinions of the Attorney-General, Vol. 15.	1,000	.....	.....	.....	.....	.....	.....	.....	For Attorney-General	1,000	Sec. 383 R. S	1,706 14
Report of the Court of Claims:												
Vol. 12	250	.....	.....	.....	.....	.....	.....	.....	Court of Claims for officers of government.	250	Sec. 1057 R. S	
Vol. 13	250	.....	.....	.....	.....	.....	.....	.....	do	250	do	
Reports of the Supreme Court:												
Vol. 95	300	.....	.....	.....	.....	.....	.....	.....	Interior Department for officers of government.	300	Secs. 681 and 683 R. S	(d)
Vol. 96	300	.....	.....	.....	.....	.....	.....	.....	do	300	do do	(d)
Vol. 97	300	.....	.....	.....	.....	.....	.....	.....	do	300	do do	(d)
Vol. 98	300	.....	.....	.....	.....	.....	.....	.....	do	300	do do	(d)
Vol. 99	300	.....	.....	.....	.....	.....	.....	.....	do	300	do do	(d)
Report of the Surveys West of the 100th Meridian:												
Vol. 2	2,000	.....	250	3	16	950	3	41	War Department	800	Acts of June 23, 1874, and February 15, 1875; con. res. May 4, 1876.	4,850 13
Vol. 4	2,000	.....	250	3	16	950	3	41	do	800	do	4,621 91
Total	655,096	188,100	108,252	1,359	2,504	274,327	879	8,244		84,417		

*See note on distribution of "usual number," page 10.

a The cost of binding the "reserved copies" is not included in this sum. *b* As only the aggregate cost of documents of which only the "usual number" is printed is given in the Reports of the Public Printer, it is impossible to state the cost of this individual volume. *c* The exact cost of the Record of any particular session cannot be determined from the Reports of the Public Printer, as only the annual expenditures for the Record are stated therein. *d* Supplied by the reporter of the Supreme Court.

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The "usual number" of copies (1,900) are distributed as follows:

	Unbound.		Bound.	
	Senate documents.	House documents.	Senate documents.	House documents.
Document room of the Senate	.....	.....	112	112
Document room of the House	411	396	313	411
Folding room of the Senate	190	.....	43	.....
Sergeant-at-Arms of the Senate	243	190	.....	.....
Office of the Secretary of the Senate	6	6	.....	.....
Office of Clerk of the House	20	149	.....	.....
Library of the House	.....	.....	7	30
Library of Congress	.....	.....	52	52
Department of State	25	25	40	40
Treasury Department	1	1	.....	.....
War Department	2	2	.....	.....
Department of the Interior	.....	.....	420	470
Office of Public Printer	4	4	1	.....
Library of Court of Claims	.....	.....	.....	2
File copies	10	10	.....	.....
Total	912	783	988	1,117

The documents of the Forty-fifth Congress delivered in unbound form amounted to 79,000 volumes; those of the Forty-sixth Congress to 96,000 volumes—most of which were doubtless ultimately sold as waste paper. These of the first session Forty-seventh Congress will amount to 80,000 volumes, if the same distribution is continued.

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TABLE B.—*DOCUMENTS ORDERED BY THE FORTY-FIFTH CONGRESS.*

Title.	Total number ordered.	Ordered for the Senate.	To each Senator.	Surplus.	Ordered for the House.	To each Representative.	Surplus.	Department or office.	Number of copies.	By what authority printed.	Cost.
President's Message and Reports of Heads of Departments.	3,000	3,000	38	36	.....	.....	.....	.....	.....	Sen. res., December 7, 1877	$281 74
United States Official Register, 1877	250	250	3	16	.....	.....	.....	.....	.....	Sen. res., December 14, 1877	407 55
United States Official Register, 1877	2,509	152	2	.....	602	2	.....	Interior Department, for government officers and depositories of documents.	1,746	Act of December 15, 1877	9,949 78
Smith's Digest of Rules and Practice.	2,000	.....	.....	.....	2,000	6	162	.....	.....	House res., Jan. 29, 1878	2,794 35
Eulogies on Hon. Edward Young Parsons.	4,500	1,000	12	64	3,500	11	167	.....	.....	Joint res., Feb. 18, 1878	1,246 96
Narrative of the Polaris Expedition	2,250	800	10	20	1,200	3	291	Navy Department	250	Con. res., Feb. 25, 1878	4,020 39
Army Register, 1878	500	500	6	32	.....	.....	.....	.....	.....	Sen. res., Feb. 25, 1878	77 34
Eulogies on Hon. O. P. Morton	12,000	4,000	51	22	8,000	26	122	.....	.....	Con. res., March 4, 1878	4,432 65
Eulogies on Hon. Lewis V. Bogy	12,000	4,000	51	22	8,000	26	122	.....	.....	do	3,580 69
Annual Report of Geological and Geographic Survey, 1877 (Hayden).	10,000	2,000	25	50	5,000	16	152	Geological Survey Interior Department	1,000 2,000	Con. res., March 6, 1878	a20,063 59
Diseases among Farm Animals	2,600	2,600	33	26	.....	.....	.....	.....	.....	Sen. res., March 12, 1878	499 09
Report on European Ships of War (King).	1,000	.....	.....	.....	.....	.....	.....	Navy Department	1,000	Con. res., March 21, 1878	1,172 34
Report of Entomological Commission.	5,000	1,500	19	18	3,000	9	273	Entomological Commission	500	Con. res., April 3, 1878	5,530 34
Report on Forestry	25,000	7,500	96	12	15,000	49	153	Agricultural Department	2,500	do	13,662 18
Report of Smithsonian Institution, 1877.	10,500	1,000	12	64	3,000	9	273	Smithsonian Institution	6,500	Con. res., April 25, 1878	3,905 28
Report of the Board of Health of District of Columbia.	1,500	.....	.....	.....	.....	.....	.....	Board of Health, D. C	1,500	do	b727 69
Report of Commissioner of Education, 1876.	5,000	.....	.....	.....	.....	.....	.....	Bureau of Education	5,000	Con. res., May 7, 1878	2,900 20
Colonial Charters and Constitutions of United States:											
Vol. 1	5,000	900	11	42	2,500	8	76	For official use For sale by Public Printer	600 1,000	Con. res., June 6, 1878	19,960 94
Vol. 2	5,000	900	11	42	2,500	8	76	For official use For sale by Public Printer	600 1,000	do	

a The cost of the 50 additional copies printed for the Library of Congress is included in this amount.
b The cost of 1,900 additional copies, the "usual number," is included in this amount.

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Title.	Total number ordered.	Ordered for the Senate.	To each Senator.	Surplus.	Ordered for the House.	To each Representative.	Surplus.	Department or office.	Number of copies.	By what authority printed.	Cost.
Report of Commissioner of Agriculture, 1877.	300,000	56,000	717	74	224,000	739	83	Department of Agriculture.	20,000	Con. res., June 6, 1878	*a*$122,887 16
Report on Transportation Routes to Seaboard, vol. 1.	700	700	8	76						Sen. res., June 14, 1878	496 12
Narrative of Second Polaris Expedition.	1,150							For sale by Public Printer	1,150	Joint res., June 15, 1878	1,747 00
Report of Commissioner of Fish and Fisheries, 1876–'77.	5,000	1,500	19	18	2,500	8	76	Commissioner of Fish and Fisheries.	1,000	Con. res., June 17, 1878	3,177 94
Final Report of United States Geological and Geographical Survey:											
Vol. 4	3,000	500	6	32	1,500	4	288	Office of Survey Smithsonian Institution	500 500	Con. res., June 18, 1878	(*b*)
Vol. 12	3,000	500	6	32	1,500	4	288	Office of Survey Smithsonian Institution	500 500	do	*a*13,121 72
Annual Report of Geological and Geographical Survey, 1878 (Hayden):											
Vol. 1	10,000	2,000	25	50	5,000	16	152	Interior Department Office of Survey	2,000 1,000	Con. res., Dec. 19, 1878	(*b*)
Vol. 2	10,000	2,000	25	50	5,000	16	152	Interior Department Office of Survey	2,000 1,000	do	(*b*)
Eulogies on Hon. J. E. Leonard	8,000	2,000	25	50	6,000	19	243			Con. res., January 17, 1879	*a*2,481 43
Report of Superintendent of Coast Survey, 1877.	1,000							Superintendent of Survey	1,000	Con. res., January 21, 1879	*c*3,413 39
Contributions to North American Ethnology, vol. 2.	3,000	750	9	48	1,500	4	288	Smithsonian Institution Office of Survey of Rocky Mountain Region.	375 375	Con. res., Jan. 25, 1879	(*b*)
Report on Geology of High Plateaus of Utah.	3,000	750	9	48	1,500	4	288	Smithsonian Institution Office of Survey of Rocky Mountain Region.	375 375	do	*a*11,880 32
Final Report U. S. Geological and Geographical Survey (Hayden):											
Vol. 3	3,000	750	9	48	1,500	4	288	Interior Department Office of Survey	375 375	do	(*b*)
Vol. 8	3,000	750	9	48	1,500	4	288	Interior Department Office of Survey	375 375	do	(*b*)

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Vol 13	3,000	750	9	48	1,500	4	288	Interior Department	375	... do	(b)
								Office of Survey	375		
Eulogies on Prof. Joseph Henry	15,000	3,000	38	36	7,000	23	31	Smithsonian Institution	5,000	Con. res., Feb. 6, 1879	$11,338 04
Report of Commissioner of Fish and Fisheries, 1877–'78.	7,500	1,500	19	18	4,500	14	258	Commissioner of Fish and Fisheries.	1,500	Con. res., Feb. 8, 1879	c9,938 13
Annual report of Geological and Geographical Survey 1876 (Hayden).	2,000							Interior Department	2,000	Con. res., February 10, 1879	3,625 71
Eulogies on Hon. Julian Hartridge	12,000	3,000	38	36	9,000	29	213			Con. res., February 27, 1879	a3,795 44
Eulogies on Hon. Gustave Schleicher	12,000	3,000	38	36	9,000	29	213			do	a3,925 25
Eulogies on Hon. Alpheus S. Williams	12,000	3,000	38	36	9,000	29	213			do	a4,159 85
Eulogies on Hon. Frank Welch	12,000	3,000	38	36	9,000	29	213			do	a3,527 70
Eulogies on Hon. Beverly B. Douglas	12,000	3,000	38	36	9,000	29	213			do	a3,528 30
Eulogies on Hon. Terrence J. Quinn	12,000	3,000	38	36	9,000	29	213			do February 28, 1879	a3,531 90
Report on the Lands of the Arid Region.	5,000	1,000	12	64	2,000	6	182	Interior Department	2,000	Con. res., March 3, 1879	4,178 57
Report on Insects affecting the Cotton-Plant.	10,000	3,000	38	36	5,000	16	152	Department of Agriculture	2,000	Con. Res., March 3, 1879	a6,253 55
Narrative of Captain Hall's Second Arctic Expedition.	5,000	1,200	15	30	2,400	7	279	Navy Department	150	...do	c14,303 31
								Naval Observatory	250		
								For sale by Public Printer	1,000		
Report of the Smithsonian Institution, 1878.	10,500	1,000	12	64	3,000	9	273	Smithsonian Institution	6,500	do	c6,035 70
Report of Superintendent of Coast Survey, 1878.	1,500							Superintendent of Survey	1,500	do	c7,444 39
Report on Paris Exposition, 1878:											
Vol. 1	13,000	3,000	38	36	6,000	19	243	State Department	4,000	do	c81,048 18
Vol. 2	13,000	3,000	38	36	6,000	19	243	do	4,000	do	
Vol. 3	13,000	3,000	38	36	6,000	19	243	do	4,000	do	
Vol. 4	13,000	3,000	38	36	6,000	19	243	do	4,000	do	
Vol. 5	13,000	3,000	38	36	6,000	19	243	do	4,000	do	
Report on Resources of Alaska (Morris)	5,000	2,000	25	50	3,000	9	273			do	c1,231 65
Report of Commissioner of Agriculture, 1878.	300,000	56,000	717	74	224,000	739	83	Department of Agriculture	20,000	do	c174,486 21
Report of the Commissioner of Education, 1877.	25,000	5,000	64	8	10,000	33	1	Commissioner of Education	10,000	do	d19,947 00
Catalogue of Library of Surgeon-General's Office:											
Vol. 1	1,500							Surgeon-General's Office	1,500	Act of March 3, 1879	11,169 62
Vol. 2	1,500							do	1,500	do	10,544 78
Total	992,950	205,752	2,614	1,864	652,202	2,124	8,634		134,996		

a The cost of the 50 additional copies printed for the Library of Congress is included in this amount.
b Not yet published.
c The cost of 1,900 additional copies, the "usual number," is included in this amount.
d The cost of 4,900 additional copies, the regular edition, is included in this amount.

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TABLE C.—*DOCUMENTS OF THE FORTY-SIXTH CONGRESS.*

[Printed in compliance with provisions of prior laws.]

Volumes.	Title.	Total number ordered.	Usual number.*	Ordered for the Senate.	To each Senator.	Surplus.	Ordered for the House.	To each Representative.	Surplus.	Department or office.	Number of copies.	By what authority printed.	Cost.
	FIRST SESSION, SENATE.												
	Journal	3,450	1,900							Interior Department	1,550	Secs. 3792, 3798 R. S. (*a*, *b*).	*c* $2,381 88
	Executive documents.												
1	Nos. 1 to 38, except 31 and 37	1,900	1,900									Sec. 3792 R. S	(*d*)
2	Observations of Transit of Venus, 1874	1,900	1,900									do	(*d*)
3	Report in Fitz-John Porter case, Parts 1 and 2.	1,900	1,900									do	(*d*)
4	Report in Fitz-John Porter case, Part 3	1,900	1,900									do	(*d*)
	Miscellaneous documents.												
1	Nos. 1 to 50	1,900	1,900									Sec. 3792 R. S	(*d*)
	FIRST SESSION, HOUSE.												
	Journal	3,450	1,900							Interior Department	1,550	Secs. 3792 and 3798 R. S	*c* 4,661 13
	Executive documents.												
1	Nos. 1 to 11	1,900	1,900									Sec. 3792 R. S	(*d*)
	Miscellaneous documents.												
1	Nos. 1 to 26, except 14 and 23	1,900	1,900									Sec. 3792 R. S	(*d*)
	Contested election:												
2	Curtin *vs.* Yocum, Part 1	1,900	1,900									do	(*d*)
3	Curtin *vs.* Yocum, Part 2	1,900	1,900									do	(*d*)
4	Curtin *vs.* Yocum, Part 3	1,900	1,900									do	(*d*)
5	Duffy *vs.* Mason	1,900	1,900									do	(*d*)
	SECOND SESSION, SENATE.												
	Journal	3,450	1,900							Interior Department	1,550	Secs. 3792 and 3798 R. S	*c* 4,453 15

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	Executive documents.												
1	Nos. 1 to 50, except 17	1,900	1,900	.....	.....	.....	.....	..	.....	.....	.....	Sec. 3792 R. S	(d)
2	Report Coast and Geodetic Survey, 1879.	1,900	1,900	.....	.....	.....	.....	...	.....	.....	.....	do	(d)
3	Nos. 51 to 99	1,900	1,900	.....	.....	.....	.....	...	.....	.....	.....	do	(d)
4	Nos. 100 to 180	1,900	1,900	.....	.....	.....	.....	...	.....	.....	.....	do	(d)
5	Nos. 181 to 216, except 208 and 209	1,900	1,900	.....	.....	.....	.....	...	.....	.....	.....	do	(d)
	Report Commissioner Education:												
6	On technical education	1,900	1,900	.....	.....	.....	.....	...	.....	.....	.....	do	(d)
7	On instruction in drawing	1,900	1,900	.....	.....	.....	.....	...	.....	.....	.....	do	(d)
	Miscellaneous documents.												
1	Nos. 1 to 53	1,900	1,900	.....	.....	.....	.....	...	.....	.....	.....	Sec. 3792 R. S.	(d)
2	Nos. 54 to 104, except 59	1,900	1,900	.....	.....	.....	.....	...	.....	.....	.....	do	(d)
3	Report of Commissioner of Fish and Fisheries, 1879.	1,900	1,900	.....	.....	.....	.....	...	.....	.....	.....	do	(d)
	Reports of committees.												
1	Nos. 1 to 9, first session, and 10 to 340, second session, except 277 and 303.	1,900	1,900	.....	.....	.....	.....	...	.....	.....	.....	Sec. 3792 R. S.	(d)
2.	Election of John J. Ingalls, and Civil Service in Rhode Island.	1,900	1,900	.....	.....	.....	.....	...	.....	.....	.....	do	(d)
3	Nos. 341 to 487, except 388	1,900	1,900	.....	.....	.....	.....	...	.....	.....	.....	do	(d)
4	Contested election, Spofford *vs.* Kellogg.	1,900	1,900	.....	.....	.....	.....	...	.....	.....	.....	do	(d)
5	Nos. 488 to 571	1,900	1,900	.....	.....	.....	.....	...	.....	.....	.....	do	(d)
6	Nos. 572 to 670	1,900	1,900	.....	.....	.....	.....	...	.....	.....	.....	do	(d)
7	Nos. 671 to 725, except Parts 2 and 3 of 693	1,900	1,900	.....	.....	.....	.....	...	.....	.....	.....	do	(d)
8	Negro exodus from Southern States	1,900	1,900	.....	.....	.....	.....	...	.....	.....	.....	do	(d)
	SECOND SESSION, HOUSE.												
	Journal	3,450	1,900	.....	.....	.....	.....	...	.....	Interior Department	1,550	Secs. 3792 and 3798 R. S.	*e* $9,011 90
	Executive documents.												
1	Foreign relations of the United States, 1879.	7,900	1,900	2,000	25	50	4,000	13	61	.....	.....	Secs. 3792 and 3798 R. S.	*c* 7,206 34
2	Report of the Secretary of War, 1879.	4,900	1,900	1,000	12	64	2,000	6	182	.....	.....	do	*c* 3,877 97
3	Engineer's, Part 1	4,900	1,900	1,000	12	64	2,000	6	182	.....	.....	do	*c* 9,427 51
4	Engineer's, Part 2	4,900	1,900	1,000	12	64	2,000	6	182	.....	.....	do	*e* 6,436 90
5	Engineer's, Part 3	4,900	1,900	1,000	12	64	2,000	6	182	.....	.....	do	*c* 3,646 59
6	(Ordnance)	4,900	1,900	1,000	12	64	2,000	6	182	.....	.....	do	*e* 4,132 75
7	(Signal Officer)	4,900	1,900	1,000	12	64	2,000	6	182	.....	.....	do	*e* 7,711 82
8	Reports of the Secretary of the Navy and Postmaster-General, 1879.	4,900	1,900	1,000	12	64	2,000	6	182	.....	.....	do	*e* 7,063 33

*See note on distribution of "usual number," page 10.

a The "usual number" was subsequently increased to 1,900.

b Only 1,670 copies of the Senate and 1,610 of the House Journal are reported by the Public Printer as printed under the provisions of this section and subsequent increase.

c The cost of binding the "reserved copies" is not included in this sum.

d As only the aggregate cost of documents of which only the "usual number" is printed is given in the reports of the Public Printer, it is impossible to state the cost of this individual volume.

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TABLE C.—*DOCUMENTS OF THE FORTY-SIXTH CONGRESS*—Continued.

Volume.	Title.	Total number ordered.	Usual number.*	Ordered for the Senate.	To each Senator.	Surplus.	Ordered for the House.	To each Representative.	Surplus.	Department or office.	Number of copies.	By what authority printed.	Cost.
9	Report of the Secretary of the Interior: Indian and Land Offices, 1879	4,900	1,900	1,000	12	64	2,000	6	182			Secs. 3792 and 3798 R. S.	*a* $6,122 26
10	Auditor Railroad Accounts, &c	4,900	1,900	1,000	12	64	2,000	6	182			do do	*a* 2,829 73
11	Education, 1879	4,900	1,900	1,000	12	64	2,000	6	182			do do	22,188 03
12	No. 1, Parts 6, 7, and 8, and Nos. 8 to 22, except 9, 10, and 13.	1,900	1,900									Sec. 3792 R. S.	(*b*)
13	Report Secretary of the Treasury, 1879.	4,900	1,900	1,000	12	64	2,000	6	182			Secs. 3792 and 3798 R. S.	*a* 4,072 47
14	Report of the Comptroller of the Currency, and Commissioner of Internal Revenue.	1,900	1,900									Sec. 3792 R. S.	(*b*)
15	Estimates of appropriations	1,900	1,900									do	(*b*)
16	Commerce and Navigation	10,050	1,900	2,000	25	50	6,150	20	90			Secs. 3792 and 3798 R. S.	*a* 12,088 90
17	Refunding national debt and specie resumption	1,900	1,900									Sec. 3792 R. S	(*b*)
18	Report National Board Health, 1879	1,900	1,900									do	(*b*)
19	Accounts of the Post-Office Department	1,900	1,900									do	(*b*)
20	Report on testing iron, steel, &c	1,900	1,900									do	(*b*)
21	Nos. 24 to 45, except 33	1,900	1,900									do	(*b*)
22	Nos. 46 to 51, except 47	1,900	1,900									do	(*b*)
23	Mail contracts	1,900	1,900									do	(*b*)
24	Nos. 52 to 89	1,900	1,900									do	(*b*)
25	Commercial relations, 1879: Part 1	6,900	1,900	2,000	25	50	3,000	9	273			Secs. 3792 and 3798 R. S.	*a* 13,343 62
26	Part 2	6,900	1,900	2,000	25	50	3,000	9	273			do do	
27	Report of Attorney-General, 1879	4,900	1,900	1,000	12	64	2,000	6	182			do do	897 22
	Miscellaneous documents.												
1	Nos. 1 to 18	1,900	1,900									Sec. 3792 R. S.	(*b*)
2	Nos. 19 to 30	1,900	1,900									do	(*b*)
3	Postal car service	1,900	1,900									do	(*b*)
4	Nos. 32 to 47, Parts 1 and 2, except 40	1,900	1,900									do	(*b*)
5	Contested election: Mackey vs. O'Connor, Part 1	1,900	1,900									do	(*b*)
6	Mackey vs. O'Connor, Part 2	1,900	1,900									do	(*b*)

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	Reports of committees.												
1	Nos. 1 to 36, first session, and 1 to 197, second session.	1,900	1,900									Sec. 3792 R. S	(b)
2	Nos. 198 to 572	1,900	1,900									do	(b)
3	Nos. 573 to 981	1,900	1,900									do	(b)
4	Nos. 982 to 1520	1,900	1,900									do	(b)
5	Nos. 1521 to 1793, except 1776	1,900	1,900									do	(b)
6	General index of journals of Congress	1,900	1,900									do	(b)
	THIRD SESSION, SENATE.												
	Journal	3,450	1,900						Interior Department	1,550		Secs. 3792 and 3798 R. S	a3,269 83
	Executive documents.												
1	Nos. 1 to 30, except 12	1,900	1,900									Sec. 3792 R. S	(b)
2	Report of Coast and Geodetic Survey, 1880.	1,900	1,900									do	(b)
3	Nos. 31 to 63, and 1 to 5, special session, March, 1881.	1,900	1,900									do	(b)
	Miscellaneous documents.												
1	Nos. 1 to 50, except 14 and 29, and Nos. 1 to 23, special session.	1,900	1,900									Sec. 3792 R. S	(b)
2	Index to private land claims	1,900	1,900									do	(b)
3	Report of Commissioner of Fish and Fisheries, 1880.	1,900	1,900									do	(b)
	Reports of committees.												
1	Nos. 726 to 935, except 916, and No. 1, special session.	1,900	1,900									Sec. 3792 R. S	(b)
2	Report of Select Committee on Election Frauds.	1,900	1,900									do	(b)
	THIRD SESSION, HOUSE.												
	Journal	3,450	1,900						Interior Department	1,550		Sec. 3792 and 3798 R. S	4,022 94
	Executive documents.												
1	Foreign Relations of United States, 1880.	7,900	1,900	2,000	25	50	4,000	13	61			Secs. 3792 and 3798 R. S	a7,138 20
2	Report Secretary of War, 1880	4,900	1,900	1,000	12	64	2,000	6	182			do do	a4,039 98
3	Engineers, Part 1	4,900	1,900	1,000	12	64	2,000	6	182			do do	a6,349 88
4	Engineers, Part 2	4,900	1,900	1,000	12	64	2,000	6	182			do do	a9,911 41
5	Engineers, Part 3	4,900	1,900	1,000	12	64	2,000	6	182			do do	a4,520 00
6	Ordnance	4,900	1,900	1,000	12	64	2,000	6	182			do do	a5,079 49
7	Signal Office	4,900	1,900	1,000	12	64	2,000	6	182			do do	ac35,026 11

*See note on distribution of "usual number," page 10. a The cost of binding the "reserve copies" is not included in this sum. b As only the aggregate cost of documents of which only the "usual number" is printed is given in the reports of the Public Printer, it is impossible to state the cost of this individual volume. c The cost of special edition of 10,000 volumes is included in this sum.

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TABLE C.—*DOCUMENTS OF THE FORTY-SIXTH CONGRESS*—Continued.

Volume.	Title.	Total number ordered.	Usual number.*	Ordered for the Senate.	To each Senator.	Surplus.	Ordered for the House.	To each Representative.	Surplus.	Department or office.	Number of copies.	By what authority printed.	Cost.
8	Reports Secretary of the Navy and Postmaster-General, 1880.	4,900	1,900	1,000	12	64	2,000	6	182			Secs. 3792 and 3798 R. S.	a$7,517 84
	Report Secretary of the Interior, 1880:												
9	Land and Indian Offices	4,900	1,900	1,000	12	64	2,000	6	182			do do	a7,283 15
10	Auditor of Railroad Accounts	4,900	1,900	1,000	12	64	2,000	6	182			do do	a3,928 74
11	Education	4,900	1,900	1,000	12	64	2,000	6	182			do	
12	No. 1, Part 6	1,900	1,900									Sec. 3792 R. S	(b)
13	Report Secretary of the Treasury, 1880	4,900	1,900	1,000	12	64	2,000	6	182			Secs. 3792 and 3798 R. S.	a4,051 32
14	Report Comptroller of the Currency and Commissioner of Internal Revenue, 1880.	1,900	1,900									Sec. 3792 R. S	(b)
15	Nos 5, 6, 67, and Miscellaneous Document No. 5.	1,900	1,900									do	(b)
	Commerce and Navigation, 1880:												
16	Part 1, Vol. 1	10,050	1,900	2,000	25	50	6,150	20	90			Secs. 3792 and 3798 R. S.	a11,631 93
16	Part 2, Vol. 2	10,050	1,900	2,000	25	50	6,150	20	90			do do	a5,303 78
17	Report of National Board of Health, 1880.	1,900	1,900									Sec. 3792 R. S	(b)
18	Nos. 9 to 66, except 12, 13, 42, 47, and 55	1,900	1,900									do	(b)
19	Report of First Comptroller and Post-Office Department accounts, 1880.	1,900	1,900									do	(b)
	Paris Exposition Report:												
20	Part 1	1,900	1,900									do	(b)
21	Part 2	1,900	1,900									do	(b)
22	Part 3	1,900	1,900									do	(b)
23	Part 4	1,900	1,900									do	(b)
24	Part 5	1,900	1,900									do	(b)
	Report of Commission to Codify Land Laws:												
25	Parts 1 and 4	1,900	1,900									do	(b)
26	Parts 2 and 3	1,900	1,900									do	(b)
27	Mail contracts	1,900	1,900									do	(b)
28	Nos 58 to 60 except 81 and 98	1,900	1,900									do	(b)
29	Decisions of First Comptroller of the	1,900	1,900									do	(b)

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30	Commercial Relations, 1880	6,900	1,900	2,000	25	50	3,000	9	273			Secs. 3792 and 3798 R. S	(b)
	Report of Attorney-General, 1880	4,900	1,900	1,000	12	64	2,000	6	182			do do	a1,003 75
	Miscellaneous documents.												
	Nos. 1 to 17, except 5, which is found in vol. 15, Ex. Docs.	1,900	1,900									Sec. 3792 R. S	(b)
	Reports of committees.												
1	Nos. 1 to 343	1,900	1,900									Sec. 3792 R. S	(b)
2	Nos. 344 to 400	1,900	1,900									do	(b)

MISCELLANEOUS PUBLICATIONS.

Congressional Directory:												
First session	11,050		1,596	21		6,321	21		Committee on Printing for official distribution.	3,133	Secs. 77 and 3801 R. S	$1,431 08
Second session, first edition	12,050		1,596	21		6,321	21		do	4,133	do	1,475 17
Second session, second edition	14,000		1,596	21		6,321	21		do	6,083	do	1,461 52
Second session, third edition	11,500		1,596	21		6,321	21		do	3,583	do	1,269 25
Third session, first edition	12,050		1,596	21		6,321	21		do	4,133	do	1,670 86
Third session, second edition	12,050		1,596	21		6,321	26		do	4,133	do	1,535 58
Congressional Record:												
Vol. 9, Part 1	10,350		3,100	39	58	7,250	23	281			Con. res. June 4, 1874	(c)
Vol. 9, Part 2	10,350		3,100	39	58	7,250	23	281			do	(c)
Index	10,350		3,100	39	58	7,250	23	281			do	(c)
Vol. 10, Part 1	10,350		3,100	39	58	7,250	23	281			do	(c)
Vol. 10, Part 2	10,350		3,100	39	58	7,250	23	281			do	(c)
Vol. 10, Part 3	10,350		3,100	39	58	7,250	23	281			do	(c)
Vol. 10, Part 4	10,350		3,100	39	58	7,250	23	281			do	(c)
Vol. 10, Part 5	10,350		3,100	39	58	7,250	23	281			do	(c)
Index	10,350		3,100	39	58	7,250	23	281			do	(c)
Vol. 11, Part 1	10,350		3,100	39	58	7,250	23	281			do	(c)
Vol. 11, Part 2	10,350		3,100	39	58	7,250	23	281			do	(c)
Vol. 11, Part 3	10,350		3,100	39	58	7,250	23	281			do	(c)
Index	10,350		3,100	39	58	7,250	23	281			do	(c)
Abridgment of Messages and Documents:												
Second session	35,000		10,000	128	16	25,000	82	154			Sec. 3798 R. S	22,341 59
Third session	35,000		10,000	128	16	25,000	82	154			do	21,157 77
Official Register, United States, 1879:												
Vol. 1	2,500		154	2		602	2		Interior Department	1,744	Act of December 15, 1877	} 16,061 26
Vol. 2	2,500		154	2		602	2		do	1,744	do	}
Pamphlet Laws:												
First session	26,629		3,000	38	36	10,000	33	1	State Department	13,629	Sec. 3807 R. S., and act of June 20, 1874.	8,691 12
Second session	26,629		3,000	38	36	10,000	33	1	do	13,629	do	15,889 50
Third session	26,629		3,000	38	36	10,000	33	1	do	13,629	do	10 941 95

* See note on distribution of "usual number," page 10. *a* The cost of binding the reserved copies is not included in this sum. *b* As only the aggregate cost of documents of which only the "usual number" is printed is given in the reports of the Public Printer, it is impossible to state the cost of this individual volume. *c* The exact cost of the Record of any particular session cannot be determined from the reports of the Public Printer, as only the annual expenditures for the Record are stated therein.

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TABLE C.—*DOCUMENTS OF THE FORTY-SIXTH CONGRESS—MISCELLANEOUS PUBLICATIONS*—Continued.

Volume.	Title.	Total number ordered.	Usual number.*	Ordered for the Senate.	To each Senator.	Surplus.	Ordered for the House.	To each Representative.	Surplus.	Department or office.	Number of copies.	By what authority printed.	Cost.
	Statutes at Large, vol. 21	3,000	.....	76	1	.....	301	1	.....	State Department for government use.	2,031	Act of June 20, 1874	$6,912 93
										For sale	592		
	Opinions of the Attorney-General, Vol. 16.	1,000	.....	.....	.....	.....	.....	.....	.....	Attorney-General	1,000	Sec. 383 R. S.	1,906 51
	Reports of the Court of Claims:												
	Vol. 14	250	.....	.....	.....	.....	.....	.....	.....	Court of Claims, for government officers.	250	Sec. 1057 R. S.	1,891 11
	Vol. 15	250	.....	.....	.....	.....	.....	.....	.....	do	250	do	1,706 14
	Reports of the Supreme Court:												
	Vol. 100	300	.....	.....	.....	.....	.....	.....	.....	Interior Department, for government officers.	300	Secs. 681 and 683 R. S.	(a)
	Vol. 101	300	.....	.....	.....	.....	.....	.....	.....	do	300	do	(a)
	Vol. 102	300	.....	.....	.....	.....	.....	.....	.....	do	300	do	(a)
	Vol. 103	300	.....	.....	.....	.....	.....	.....	.....	do	300	do	(a)
	Report of Surveys West of 100th Meridian:												
	Vol. 6	2,000	.....	250	3	16	950	3	41	War Department	800	Acts of June 23, 1874, and February 15, 1875; con. res., May 4, 1876.	3,187 81
	Vol. 7	2,000	.....	250	3	16	950	3	41	do	800	do	3,504 46
	Medical and Surgical History of the Rebellion, part 2, vol. 1.	10,000	.....	2,000	25	50	5,000	16	152	Surgeon-General's Office.	3,000	Acts of July 28, 1866; June 8, 1872, and March 3, 1875; joint res., March 3, 1869; con. res., May 27, 1872.	19,674 32
	Total	736,887	222,300	121,760	1,527	2,912	304,031	972	9,777	.....	88,796		

* See note on distribution of "usual number," page 10.

a Supplied by the reporter of the Supreme Court.

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TABLE D.—*DOCUMENTS ORDERED BY THE FORTY-SIXTH CONGRESS.*

Title.	Total number ordered.	Ordered for the Senate.	To each Senator.	Surplus.	Ordered for the House.	To each Representative.	Surplus.	Department or office.	Number of copies.	By what authority printed.	Cost.
Report on Interoceanic Ship Canal	200							Navy Department	200	Sen. res., April 23, 1879	$187 60
Report on Diseases of Swine and other Domestic Animals.	100,000	25,000	320	40	70,000	231	9	Department of Agriculture.	5,000	Con. res., June 17, 1879	41,404 54
Report on the Transit of Venus	250							Naval Observatory	250	Con. res., June 20, 1879	*a*1,151 13
Report on Condition of European Working Classes.	15,000	4,000	51	22	8,000	26	122	State Department	3,000	....do	4,000 00
Report on Geology of the Henry Mountains	5,000	1,000	12	64	3,000	9	273	Interior Department Office of Geological Survey	500 500	... do	*b*6,366 38
Final Report United States Centennial Commission:											
Vol. 1	5,000	1,000	12	64	3,000	9	273	State Department Centennial Commission	500 500	Joint res., June 21, 1879	
Vol. 2	5,000	1,000	12	64	3,000	9	273	State Department Centennial Commission	500 500	....do	
Vol. 3	5,000	1,000	12	64	3,000	9	273	State Department Centennial Commission	500 500	....do	
Vol. 4	5,000	1,000	12	64	3,000	9	273	State Department Centennial Commission	500 500	....do	
Vol. 5	5,000	1,000	12	64	3,000	9	273	State Department Centennial Commission	500 500	....do	*b*39,025 66
Vol. 6	5,000	1,000	12	64	3,000	9	273	State Department Centennial Commission	500 500	....do	
Vol. 7	5,000	1,000	12	64	3,000	9	273	State Department Centennial Commission	500 500	....do	
Vol. 8	5,000	1,000	12	64	3,000	9	273	State Department Centennial Commission	500 500	....do	
Vol. 9	5,000	1,000	12	64	3,000	9	273	State Department Centennial Commission	500 500	....do	
Report on the Metric System	10,000	2,500	32	4	7,500	24	228			Con. res., June 23, 1879	2,318 51
Eulogies on Hon. J. E. Leonard	8,000	2,000	25	50	6,000	19	243			....do	*b*2,481 43
Report of Paris Monetary Conference.	12,000	3,000	38	36	6,000	19	243	State Department	3,000	Con. res., June 24, 1879	6,864 96
Report on Geology of the Black Hills of Dakota.	2,000	500	6	32	1,000	3	91	Interior Department	500	....do	*a*10,699 18
Report of Board of Medical Experts	10,000	2,000	25	50	6,000	19	243	National Board of Health	2,000	Act of July 1, 1879	(*c*)

a The cost of 1,900 additional copies, "the usual number," is included in this amount. *b* The cost of the 50 additional copies printed for the Library of Congress is included in this amount. *c* Not yet published.

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TABLE D.—*DOCUMENTS ORDERED BY THE FORTY-SIXTH CONGRESS*—Continued.

Title.	Total number ordered.	Ordered for the Senate.	To each Senator.	Surplus.	Ordered for the House.	To each Representative.	Surplus.	Department or office.	Number of copies.	By what authority printed.	Cost.
President's Message and Reports of Heads of Departments.	3,000	3,000	38	36	.....	.....	.....	.....	.....	Sen. res., December 8, 1879	$316 62
Digest of Rules of House of Representatives.	2,000	.....	.....	.....	2,000	6	182	.....	.....	House res., December 19, 1879.	3,115 45
Report of District Health Officer, 1879.	2,500	.....	.....	.....	.....	.....	.....	Health Officer	2,500	Con. res., January 29, 1880	991 97
Report on Foreign System of Educating Naval Officers, &c.	1,000	.....	.....	.....	.....	.....	.....	Navy Department	1,000	Sen. res., February 2, 1880	271 28
American Ephemeris and Nautical Almanac:											
1884	1,500	100	1	22	400	1	97	.....do	1,000	Joint res., February 11, 1880	*a* 3,339 06
1885	1,500	100	1	22	400	1	97	.....do	1,000	.....do	*a* 3,444 01
Eulogies on Hon. Z. Chandler	12,000	4,000	51	22	8,000	26	122	.....	.....	Joint res., February 17, 1880	*a* 4,601 31
Eulogies on Hon. Rush Clark	9,000	3,000	38	36	6,000	19	243	.....	.....	Joint res., February 25, 1880	*a* 2,753 82
Army Register	1,000	1,000	12	64	.....	.....	.....	.....	.....	Sen. res., March 18, 1880	45 38
Navy Register	1,000	1,000	12	64	.....	.....	.....	.....	.....	.....do	120 08
Final Report of Geological and Geographical Survey:											
Vol. 3	1,200	.....	.....	.....	.....	.....	.....	Interior Department	1,200	Con. res., March 19, 1880	(*b*)
Vol. 4	1,500	.....	.....	.....	.....	.....	.....	.....do	1,500	.....do	(*b*)
Vol. 8	1,200	.....	.....	.....	.....	.....	.....	.....do	1,200	.....do	(*b*)
Vol. 12	1,500	.....	.....	.....	.....	.....	.....	.....do	1,500	.....do	5,784 90
Vol. 13	1,200	.....	.....	.....	.....	.....	.....	.....do	1,200	.....do	(*b*)
Bulletin No. 3, Entomological Commission (Cotton-Worm).	10,000	3,000	38	36	6,000	19	243	.....do	1,000	.....do	1,337 75
Bulletin No. 5, Entomological Commission (Chinch-Bug).	6,000	2,000	25	50	3,000	9	273	.....do	1,000	Sen. res., March 19, 1880	128 29
Report of U. S. Fish Commission:											
Vol. 1	3,000	700	8	76	1,800	5	285	Fish Commissioner	500	Con. res., March 25, 1880	(*b*)
Vol. 2	3,000	700	8	76	1,800	5	285	.....do	500	.....do	(*b*)
Vol. 3	3,000	700	8	76	1,800	5	285	.....do	500	.....do	1,531 28
Vol. 4	3,000	700	8	76	1,800	5	285	.....do	500	.....do	1,923 14
Vol. 5	3,000	700	8	76	1,800	5	285	.....do	500	.....do	1,906 76
Report of Committee on Depression of Labor.	5,000	.....	.....	.....	5,000	16	152	.....	.....	House res., April 1, 1880	96 81
Report on Sheep Husbandry	13,000	8,000	38	36	10,000	33	1	.....	.....	Joint res., April 1, 1880	1,186 75
Report of Statistics of 1879	3,000	1,000	12	64	2,000	9	279	Naval Observatory	1,000	Con. res., April 9, 1880	9,354 85

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Second Report of Entomological Commission.	10,000	3,000	38	36	5,000	16	152	Entomological Commission	2,000	.....do	a 15,338	14
Eulogies on Hon. A. M. Lay	2,000	500	6	32	1,500	4	228			.....do	a 605	66
Final Report of Geological and Geographical Survey, vol. 14	5,000	1,200	15	30	2,800	9	73	Interior Department	1,000	Con. res., April 17, 1880	(b)	
Report of Chief Signal Officer, 1879	5,000							Signal Office	5,000	Joint res., April 22, 1880	6,252	98
Eulogies on Hon. George S. Houston	12,000	4,000	51	22	8,000	26	122			Joint res., April 29, 1880	a 4,557	95
Report on Iron, Steel, and other Metals:												
Vol. 1	3,000	1,000	12	64	2,000	6	182			Con. res., May 5, 1880	(b)	
Vol. 2	3,000	1,000	12	64	2,000	6	182			.....do	c 11,273	60
Report on Beet Sugar	20,000	4,800	61	42	14,200	46	262	Agricultural Department	1,000	Con. res., May 6, 1880	a 10,739	10
Report on Diseases of Domestic Animals.	100,000	25,000	320	40	60,000	198	6	.....do	15,000	.....do	a 44,818	87
Report of the Smithsonian Institution, 1879.	15,500	2,500	32	4	6,000	19	243	Smithsonian Institution	7,000	Con. res., May 22, 1880	c 9,331	75
Proceedings relating to the acceptance of Jefferson's desk.	10,000	3,000	38	36	7,000	23	31			Con. res., May 26, 1880	260	47
Contributions to North American Ethnology:												
Vol. 4	5,000	1,000	12	64	3,000	9	273	Smithsonian Institution	1,000	.....do	a 9,955	14
Vol. 5	5,000	1,000	12	64	3,000	9	273	.....do	1,000	.....do	(b)	
Report of Life-Saving Service, 1879	6,000							Secretary of the Treasury	6,000	.....do	1,328	29
Report of Coast and Geodetic Survey, 1879.	3,000							Coast and Geodetic Survey	3,000	Con. res., May 28, 1880	(b)	
Report of Commissioner of Agriculture, 1879.	300,000	56,000	717	74	214,000	706	82	Agricultural Department	30,000	Con. res., May 31, 1880	a 206,563	29
Report on Fish and Fisheries, 1879	10,000	2,000	25	50	6,000	19	243	Fish Commissioner For sale by Public Printer.	1,500 500	Joint res., June 1, 1880	c 12,223	23
Supplement to Revised Statutes	8,357	836	10	56	3,221	10	191	State Department: For government offices For sale	2,300 2,000	Joint res., June 7, 1880	a 17,589	40
First Annual Report of Bureau of Ethnology.	15,000	3,000	38	36	7,000	23	31	Smithsonian Institution	5,000	Con. res., June 14, 1880	a 55,137	12
Report of Commissioner of Education:												
1878	25,000	4,000	51	22	8,000	26	122	Commissioner of Education	13,000	Joint res., June 16, 1880	c 19,890	86
1879	25,000	4,000	51	22	8,000	26	122	.....do	13,000	.....do	c 22,188	03
Manual of the Rules of the Senate	1,000	1,000	12	64						Sen. res., June 16, 1880	1,660	20
Official Records of the War of the Rebellion: d												
Vol. 1	10,900	2,000	25	50	7,000	23	31	Executive departments	1,000	Act of June 16, 1880	6,765	76
Vol. 2	10,000	2,000	25	50	7,000	23	31	..... do	1,000	.... do	9,168	68
Vol. 3	10,000	2,000	25	50	7,000	23	31	.....do	1,000	.....do	7,214	34
Vol. 4	10,000	2,000	25	50	7,000	23	31	.....do	1,000	.....do	7,091	63
Vol. 5	10,000	2,000	25	50	7,000	23	31	.....do	1,000	.... do	9,717	92
President's Message and Reports of Heads of Departments.	3,000	3,000	38	36						Sen. res., Dec. 13, 1880	68	71
Report of Coast and Geodetic Survey, 1880.	3,000							Superintendent of Survey.	3,000	Con. res., January 22, 1881	(b)	

a The cost of the 50 additional copies printed for the Library of Congress is included in this amount. b Not yet published. c The cost of 1,900 additional copies, the "usual number," is included in this amount. d It is estimated that this work will comprise 96 volumes. As, however, the law defining the number to be printed, and directing the distribution thereof, was materially modified by the Forty-seventh Congress, only the five volumes previously issued are here enumerated. e The cost of 4,900 additional copies, the regular edition, is included in this amount.

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TABLE D.—*DOCUMENTS ORDERED BY THE FORTY-SIXTH CONGRESS*—Continued.

Title.	Total number ordered.	Ordered for the Senate.	To each Senator.	Surplus.	Ordered for the House.	To each Representative.	Surplus.	Department or office.	Number of copies.	By what authority printed.	Cost.
Report of Commissioner of Fish and Fisheries.	10,000	2,000	25	50	6,000	19	243	Commissioner of Fish and Fisheries. For sale by Public Printer..	1,500 500	Con. res. January 22, 1881.	(a)
Report of the District Health Officer, 1880.	2,500	100	1	22	300	1	.....	Board of Health	2,100	Con. res., January 25, 1881 ..	$1,037 45
Report on the Cotton-Worm.....	30,000	10,000	128	16	18,180	60	.....	Interior Department.....	1,820	Con. res., January 27, 1881 ..	(a)
Report of the National Board of Health, 1880.	6,000	1,500	19	18	3,000	9	273	Board of Health	1,500	Joint res., February 1, 1881..	b11,271 47
Report of the Smithsonian Institution, 1880.	15,560	2,500	32	4	6,060	20	.....	Smithsonian Institution	7,000	Con. res. February 3, 1881...	b10,735 82
Report on Organization, &c., of Military Academy.	1,000	.....	.....	.....	.....	.....	.....	Congress	1,000	.....do	664 75
Hayden's Atlas of Colorado	3,000	800	10	20	1,515	5	.....	Interior Department.....	685	Joint res., February 14, 1881 .	17,202 24
Report on Contagious Diseases of Domestic Animals.	50,000	12,000	153	66	30,300	100	.....	Commissioner of Agriculture.	7,700	.....do	c37,761 23
New Discoveries in Fish Culture	6,900	1,000	12	64	2,500	8	76	Usual number	1,900	....do	(a)
								Fish Commission	1,500		
Second Annual Report of Bureau of Ethnology.	15,000	3,000	38	36	7,272	24	.....	Bureau of Ethnology	4,728	Con. res., February 18, 1881..	(a)
Third Annual Report of Bureau of Ethnology.	15,000	3,000	38	36	7,272	24	.....	.....do	4,728	..... do	(a)
Reports on Foreign Commerce and Manufactures, Nos. 1, 2, 3.	50,000	15,000	192	24	35,000	115	155	.....	.....	Con. res., February 23, 1881..	c20,947 56
Report of Life-Saving Service, 1880 ...	6,000	.....	.....	.....	.....	.....	.....	Secretary of the Treasury .	6,000	Joint res., February 25, 1881 .	1,557 62
Report of the Commissioner of Education, 1880.	25,000	4,000	51	22	8,181	27	.....	Commissioner of Education	12,819	.....do	(a)
Third Report United States Entomological Commission.	30,000	7,000	89	58	20,907	69	.....	Interior Department.....	2,093	Joint res., March 1, 1881....	(a)
Report on Production of Precious Metals.	15,000	3,000	38	36	8,000	26	122	Treasury Department	4,000	Joint res. March 3, 1881	b6,602 92
Contributions to North American Ethnology:											
Vol. 6	6,000	1,000	12	64	3,030	10	.....	Bureau of Ethnology	1,970	Con. res., March 2, 1881	(a)
Vol. 7	6,000	1,000	12	64	3,030	10	.....	.....do	1,970	.....do	(a)

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Vol. 8	6,000	1,000	12	64	3,030	10	.....	..... do	1,970	..... do	(a)
Vol. 9	6,000	1,000	12	64	3,030	10	.....	..... do	1,970	..... do	(a)
Vol. 10	6,000	1,000	12	64	3,030	10	.....	..... do	1,970	..... do	(a)
Report of Chief Signal Officer, 1880	10,000	.....	.....	.....	.....	.....	.....	War Department	10,000	Con. res., March 3, 1881	a35,026 11
Eulogies on Hon. Evarts W. Farr	12,000	3,000	38	36	9,000	29	213	.....	.....	Joint res., March 3, 1881	(a)
Report of the Commissioner of Agriculture, 1880.	300,000	56,000	717	74	214,000	706	82	Agricultural Department	80,000	..... do	c307,029 18
Report of Committee on Transportation Routes to Seaboard, vol. 1.	5,000	2,000	25	50	3,000	9	273	.....	.....	Act of March 3, 1881	2,879 22
Catalogue of Library of Surgeon-General's Office, vol. 3.	1,500	.....	.....	.....	.....	.....	.....	Surgeon-General's Office	1,500	..... do	10,865 65
Navy Register, 1881	500	500	6	32	.....	.....	.....	.....	.....	Sen. res., March 3, 1881	47 39
Total	1,587,367	336,936	4,271	3,798	978,658	3,192	11,427		271,773		

a Not yet published.
b The cost of 1,900 additional copies, the "usual number," is included in this amount.
c The cost of the 50 additional copies printed for the Library of Congress is included in this amount.

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TABLE E.—*DOCUMENTS OF THE FORTY-SEVENTH CONGRESS, FIRST SESSION.*

[Printed in compliance with provisions of prior laws.]

Volume.	Title.	Total number ordered.	Usual number.*	Ordered for the Senate.	To each Senator.	Surplus.	Ordered for the House.	To each Representative.	Surplus.	Department or office.	Number of copies.	By what authority printed.	Cost.
	SENATE.												
	Journal	3,450	1,900							Interior Department	1,550	Secs. 3792 and 3798 R. S. *a b*	(*c*)
	Executive documents.												
1	Nos. 1 to 36	1,900	1,900									Sec. 3792 R. S.	(*c*)
2	Nos. 37 to 70, except 49	1,900	1,900									do	(*c*)
3	No. 49, Coast Survey, 1881	1,900	1,900									do	(*c*)
4	Nos. 71 to 88	1,900	1,900									do	(*c*)
5	Nos. 89 to 158	1,900	1,900									do	(*c*)
6	Nos. 159 to 197, except 196	1,900	1,900									do	(*c*)
7	No. 196, Expenditures for Rivers and Harbors, 1789 to 1882.	1,900	1,900									do	(*c*)
	Miscellaneous documents.												
1	Nos. 1 to 9, special session, and 1 to 98, first session.	1,900	1,900									Sec. 3792 R. S.	(*c*)
2	Nos. 99 to 115, except 110	1,900	1,900									do	(*c*)
3	No. 110, Report on Fish and Fisheries, 1881.	1,900	1,900									do	(*c*)
4	Nos. 116 to 133, except 123 and 124	1,900	1,900									do	(*c*)
5	No. 123, Eulogy on Life of James A. Garfield.	1,900	1,900									do	(*c*)
	No. 124, Report on Food Fishes and Fisheries of United States:												
6	Part 1	1,900	1,900									do	(*c*)
7	Part 2	1,900	1,900									do	(*c*)
8	Part 3	1,900	1,900									do	(*c*)
	Reports of committees.												
9	Nos. 1 to 134, except 260	1,900	1,900									Secs. 3792 R. S.	(*c*)

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2	No. 265, Parts 1 and 2, Contingent Expenditures of Executive Departments.	1,900	1,900									do	(c)
3	Nos. 344 to 588	1,900	1,900									do	(c)
4	Nos. 589 to 878	1,900	1,900									do	(c)
	HOUSE.												
	Journal	3,450	1,900						Interior Department	1,550	Secs. 3792 and 3798 R. S		(c)
	Executive documents.												
1	Report on Foreign Relations, 1881	7,900	1,900	2,000	25	50	4,000	13	61			Sec. 3792 and 3798 R. S	(c)
2	Report of Secretary of War, 1881	4,900	1,900	1,000	12	64	2,000	6	182			do do	(c)
3	Chief of Engineers, 1881, Part 1	4,900	1,900	1,000	12	64	2,000	6	182			do do	(c)
4	Chief of Engineers, 1881, Part 2	4,900	1,900	1,000	12	64	2,000	6	182			do do	(c)
5	Chief of Engineers, 1881, Part 3	4,900	1,900	1,000	12	64	2,000	6	182			do do	(c)
6	Chief of Ordnance, 1881	4,900	1,900	1,000	12	64	2,000	6	182			do do	(c)
7	Chief Signal Officer, 1881	4,900	1,900	1,000	12	64	2,000	6	182			do do	(c)
8	Report of Secretary of Navy and Postmaster-General, 1881.	4,900	1,900	1,000	12	64	2,000	6	182			do do	(c)
	Report of Secretary of Interior, 1881:												
9	Vol. 1, Land Office	4,900	1,900	1,000	12	64	2,000	6	182			do do	(c)
10	Vol. 2, Indian Office, &c	4,900	1,900	1,000	12	64	2,000	6	182			do do	(c)
11	Vol. 3, Geological Survey	4,900	1,900	1,000	12	64	2,000	6	182			do do	(c)
12	Vol. 4, Education	4,900	1,900	1,000	12	64	2,000	6	182			do	(c)
13	No. 1, Part 6, and Nos. 8 to 12	1,900	1,900									do	(c)
14	No. 2, Report on Finances, 1881	4,900	1,900	1,000	12	64	2,000	6	182			Sec. 3792 and 3798 R. S	(c)
15	Nos. 3 and 4	1,900	1,900									do	(c)
16	Nos. 5, 6, and 62	1,900	1,900									do	(c)
17	No. 7, Commerce and Navigation, 1881	10,050	1,900	2,000	25	50	6,150	20	90			Sec. 3792 and 3798 R. S	(c)
18	Nos. 13 to 19	1,900	1,900									do	(c)
19	Nos. 20 to 86, except 62	1,900	1,900									do	(c)
20	Nos. 87 to 116	1,900	1,900									do	(c)
21	Nos. 117 to 121	1,900	1,900									do	(c)
22	Nos. 122 to 192	1,900	1,900									do	(c)
23	Nos. 193 to 227, except 219 and 226	1,900	1,900									do	(c)
24	No. 219, Decisions of First Comptroller of the Treasury, 1881-'82.	1,900	1,900									do	(c)
25	No. 226, Allowances to Mail Contractors, 1880-'81.	1,900	1,900									do	(c)
26	No. 228, Agricultural Report, 1881	1,900	1,900									do	(c)
	Miscellaneous documents.												
1	Nos. 1 to 13, except 8 and 11	1,900	1,900									Sec. 3792 R. S	(c)
2	No. 8	1,900	1,900									do	(c)

*See note on distribution of "usual number," page 10.

a The "usual number" was subsequently increased to 1,900.

b Only 1,670 copies of the Senate, and 1,610 of the House Journal are reported by the Public Printer as printed under the provisions of this section and subsequent increase.

c As the entire edition of few, if any, of the executive and miscellaneous documents and reports of this session has yet been printed and bound, it is impossible to state the cost of the same.

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TABLE E.—*DOCUMENTS OF THE FORTY-SEVENTH CONGRESS, FIRST SESSION*—Continued.

Volume.	Title.	Total number ordered.	Usual number.*	Ordered for the Senate.	To each Senator.	Surplus.	Ordered for the House.	To each Representative.	Surplus.	Department or office.	Number of copies.	By what authority printed.	Cost.
3	No. 11	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	Sec. 3792 R. S	a)
4	Nos. 14 and 15, Parts 1 and 2	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
5	Nos. 16, 17, 18, and 21	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
6	No. 19	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
7	Nos. 20 and 22	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
8	Nos. 23, 24, 25, and 26	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
9	No. 27	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
10	Nos. 28 to 40	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
11	Nos. 41 to 47, and 49 and 65	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
12	No. 48	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
13	No. 50	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
14	No. 51	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
15	No. 52	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
16	No. 53	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
17	No. 54	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
18	Nos. 55, 56, 57, and 58	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
19	Nos. 59 and 60	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
20	No. 61	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
21	No. 62	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
22	No. 63	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
23	No. 64	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
24	No. 66	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
25	No. 67	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
	Reports of committees.												
1	Nos. 1 to 500 inclusive	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	Sec. 3792 R. S	a)
2	Nos. 501 to 1000 inclusive	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
3	Nos. 1001 to 1400 inclusive	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)
4	Nos. 1401 to 1811 inclusive	1,900	1,900	.....	....	.....	.....	....	.....	.....	.....	do	a)

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Congressional Directory: Special session.	13,150	.....	1,596	21	.....	6,321	21	.....	Committee on Printing for official distribution.	5,233	Secs. 77 and 3801 R. S	$1,316 02
First session:												
First edition	12,050	.....	1,596	21	.....	6,321	21	.....	.....do	4,133	.....do	1,710 92
Second edition.....	13,050	.....	1,596	21	.....	6,321	21	.....	.....do	5,133	.....do	1,876 44
Third edition.....	14,900	.....	1,596	21	.....	6,321	21	.....	.....do	6,983	.....do	1,833 31
Congressional Record:												
Part 1	10,748	.....	3,425	43	71	7,250	23	281	Supreme Court ..... / Official reporters of Senate. / State and Territorial libraries.	18 / 5 / 50	Con. res. June 4, 1874; joint res. January 27, 1881; con. res. June 24, 1882; joint res. August 2, 1882.	(b)
Part 2	10,748	.....	3,425	43	71	7,250	23	281	Supreme Court ..... / Official reporters of Senate. / State and Territorial libraries.	18 / 5 / 50	Con. res. June 4, 1874; joint res. January 27, 1881; con. res. June 24, 1882; joint res. August 2, 1882.	(b)
Part 3	10,748	.....	3,425	43	71	7,250	23	281	Supreme Court ..... / Official reporters of Senate. / State and Territorial libraries.	18 / 5 / 50	Con. res. June 4, 1874; joint res. January 27, 1881; con. res. June 24, 1882; joint res. August 2, 1882.	(b)
Part 4	10,748	.....	3,425	43	71	7,250	23	281	Supreme Court ..... / Official reporters of Senate. / State and Territorial libraries.	18 / 5 / 50	Con. res. June 4, 1874; joint res. January 27, 1881; con. res. June 24, 1882; joint res. August 2, 1882.	(b)
Part 5	10,748	.....	3,425	43	71	7,250	23	281	Supreme Court ..... / Official reporters of Senate. / State and Territorial libraries.	18 / 5 / 50	Con. res. June 4, 1874; joint res. January 27, 1881; con. res. June 24, 1882; joint res. August 2, 1882.	(b)
Part 6	10,748	.....	3,425	43	71	7,250	23	281	Supreme Court ..... / Official reporters of Senate. / State and Territorial libraries.	18 / 5 / 50	Con. res. June 4, 1874; joint res. January 27, 1881; con. res. June 24, 1882; joint res. August 2, 1882.	(b)
Part 7	10,748	.....	3,425	43	71	7,250	23	281	Supreme Court ..... / Official reporters of Senate. / State and Territorial libraries.	18 / 5 / 50	Con. res. June 4, 1874; joint res. January 27, 1881; con. res. June 24, 1882; joint res. August 2, 1882.	(b)

* See note on distribution of "usual number," page 10.

a As the entire edition of few, if any, of the executive and miscellaneous documents and reports of this session has yet been printed and bound, it is impossible to state the cost of the same.

b The exact cost of the Record of any particular session cannot be determined from the reports of the Public Printer, as only the annual expenditures for the Record are stated therein.

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TABLE E.—*DOCUMENTS OF THE FORTY-SEVENTH CONGRESS, FIRST SESSION—MISCELLANEOUS PUBLICATIONS*—Continued.

Volume.	Title.	Total number ordered.	Usual number.*	Ordered for the Senate.	To each Senator.	Surplus.	Ordered for the House.	To each Representative.	Surplus.	Department or office.	Number of copies.	By what authority printed.	Cost.
	Congressional Record Index	10,748	.....	3,425	43	71	7,250	23	281	Supreme Court Official reporters of Senate. State and Territorial libraries.	18 5 50	Con. res. June 4, 1874; joint res. January 27, 1881; con. res. June 24, 1882; joint res. August 2, 1882.	(a)
	Abridgments of Messages and Documents.	35,000	.....	10,000	128	16	25,000	82	154	.....	.....	Sec. 3798 R. S	21,433 16
	Official Register United States, 1881:												
	Vol. 1	2,500	.....	154	2	.....	602	2	.....	Interior Department	1,744	Act of December 15, 1877	b$11,666 66
	Vol. 2	2,500	.....	154	2	.....	602	2	.....	do	1,744	do	b11,843 77
	Pamphlet Laws	26,629	.....	3,000	38	36	10,000	33	1	State Department	13,629	Sec. 3807 R. S., and act June 20, 1874.	18,557 92
	Report of the Court of Claims, Vol. 16	250	.....	.....	.....	.....	.....	.....	.....	Court of Claims for government officers.	250	Sec. 1057 R. S	1,906 51
	Reports of the Supreme Court:												
	Vol. 104	300	.....	.....	.....	.....	.....	.....	.....	Interior Department for government officers.	300	Secs. 681 and 683 R. S	(c)
	Vol. 105	300	.....	.....	.....	.....	.....	.....	.....	do	300	do	(c)
	Report of Surveys West of 100th Meridian, Vol. 3, Supplement.	2,000	.....	250	3	16	950	3	41	War Department	800	Acts June 23, 1874, and February 15, 1875; con. res. May 4, 1876.	2,492 97
	Report on Tertiary History of the Grand Cañons.	3,000	.....	.....	.....	.....	.....	.....	.....	Geological Survey, for sale and exchange.	3,000	Act of March 3, 1879	b80,854 22
	Total	409,263	144,400	63,342	795	1,504	154,588	495	4,779	.....	46,933	.....	.....

* See note on distribution of "usual number," page 10.

a The exact cost of the Record of any particular session cannot be determined from the reports of the Public Printer, as only the annual expenditures for the Record are stated therein.

b The cost of the 50 additional copies printed for the Library of Congress is included in this amount.

c Supplied by the reporter of the Supreme Court.

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TABLE F.—*DOCUMENTS ORDERED BY THE FORTY-SEVENTH CONGRESS, FIRST SESSION.*

Title.	Total number ordered. a	Ordered for the Senate.	To each Senator.	Surplus.	Ordered for the House.	To each Representative.	Surplus.	Department or office.	Number of copies.	By what authority printed.	Cost.
Official Register United States, 1881, Vol. 1.	500	500	6	32	.....	.....	.....	.....	.....	Sen. res., October 26, 1881.....	$633 68
Eulogies on Hon. Fernando Wood.....	12,000	4,000	51	22	8,000	26	122	.....	.....	Joint res., February 15, 1882...	(b)
Eulogies on Hon. M. H. Carpenter.....	12,000	4,000	51	23	8,000	26	122	.....	.....	.....do	(b)
Eulogies on Hon. A. E. Burnside	12,000	4,000	51	22	8,000	26	122	.....	.....	.....do	(b)
Digest of Rules of the House	2,000	.....	.....	.....	2,000	6	182	.....	.....	House res., February 16, 1882..	c2,907 92
Navy Register, 1882.....	1,000	1,000	12	64	.....	.....	.....	.....	.....	Sen. res,, March 8, 1882.....	110 10
Army Register, 1882	1,000	1,000	12	64	.....	.....	.....	.....	.....	.....do	266 23
Report of the Health Officer of the District of Columbia, 1881.	2,500	100	1	22	300	1	.....	Health Officer	2,100	Joint res., March 6, 1882.....	1,165 61
Eulogies on Hon. M. P. O'Connor.....	12,000	3,000	38	36	9,000	29	213	.....	.....	Joint res., March 15, 1882.....	(b)
Report of Treasury Cattle Commission.	3,000	3,000	38	36	.....	.....	.....	.....	.....	Sen. res., March 17, 1882.....	430 83
Digest of Rules of the House.	250	.....	.....	.....	.....	.....	.....	Journal clerk	250	House res., May 12, 1882.....	(b)
Statistical Abstract of United States, 1881.	4,000	4,000	51	22	.....	.....	.....	.....	.....	Sen. res., June 6, 1882.....	437 88
Memorial Address on President Garfield.	31,000	10,000	128	16	20,000	66	2	Department of State.....	500	Joint res., June 7, 1882.....	(b)
								Mrs. L. R. Garfield.....	250		
								Hon. J. G. Blaine.....	250		
Report of Smithsonian Institution, 1881.	15,560	2,500	32	4	6,060	20	.....	Smithsonian Institution	7,000	Con. res., June 20, 1882.....	(b)
Report of Commissioner of Fish and Fisheries, 1881.	10,000	2,000	25	50	6,000	19	243	Fish Commissioner	1,500	.....do	(b)
								For sale by Public Printer...	500		
Report of Coast and Geodetic Survey, 1881.	3,000	.....	.....	.....	.....	.....	.....	Superintendent of Survey....	3,000	Con. res., June 21, 1882.....	(b)
Report on Upper Columbia River (Symons).	5,000	1,500	19	18	3,000	9	273	War Department	500	Con. res., June 24, 1882.....	(b)
Memorial Address on President Garfield.	1,500	.....	.....	.....	.....	.....	.....	Hon. J. G. Blaine	750	Sen. res., June 27, 1882.....	(b)
								Mrs. L. R. Garfield.....	750		
Report on Angora Goat Husbandry...	10,000	3,000	38	36	7,000	23	31	.....	.....	Joint res., July 1, 1882.....	(b)
List of Merchant Vessels, 1881	1,000	.....	.....	.....	.....	.....	.....	State Department.....	1,000	Con. res., July 1, 1882.....	(b)

a By authority of a joint resolution approved July 7, 1882, the "usual number" (1,900) of each document named in this table, ordered by the two houses of Congress, will be printed additional to those herein specified, excepting such as are included in the executive or miscellaneous documents of Congress, and those printed prior to the passage of said resolution.

b Not yet published.

c The cost of the 50 additional copies printed for the Library of Congress is included in this amount.

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TABLE F.—*DOCUMENTS ORDERED BY THE FORTY-SEVENTH CONGRESS, FIRST SESSION.*—Continued.

Title.	Total number ordered. a	Ordered for the Senate.	To each Senator.	Surplus.	Ordered for the House.	To each Representative.	Surplus.	Department or office.	Number of copies.	By what authority printed.	Cost.
Report on insects affecting the Orange Trees.	5,000	1,500	19	18	2,500	8	76	Agricultural Department.....	1,000	Con. res., July 5, 1882.....	(b)
Bibliography of Economic Entomology.	1,000	.....	.....	.....	.....	.....	.....	.....do	1,000	.....do	(b)
Report on Insects affecting Forest Trees.	2,000	.....	.....	.....	.....	.....	.....	.....do	2,000	.....do	(b)
Report of Life Saving Service, 1881....	10,000	.....	.....	.....	.....	.....	.....	Treasury Department	10,000	Joint res., July 19, 1882.....	(b)
Report on Food Fishes and Fisheries of United States:											
Vol. 1	10,000	2,500	32	4	5,000	16	152	Fish Commissioner	1,500	Con. res., July 21, 1882.....	(d)
								For sale by Public Printer...	1,000		
Vol. 2	10,000	2,500	32	4	5,000	16	152	Fish Commissioner	1,500	... do	(b)
								For sale by Public Printer...	1,000		
Vol. 3	10,000	2,500	32	4	5,000	16	152	Fish Commissioner	1,500	....do	(b)
								For sale by Public Printer...	1,000		
Report on Tornadoes in Western States.	3,000	750	9	48	1,500	4	288	Signal Service Bureau	750	Joint res., July 21, 1882.....	(b)
Report of Surgeon-General of the Navy.	1,000	.....	.....	.....	.....	.....	.....	Navy Department	1,000	Con. res., July 25, 1882.....	(b)
Report of Director of Mint on Gold and Silver Production.	9,000	2,000	25	50	4,000	13	61	Director of the Mint.....	3,000	Con. res., July 28, 1882.....	(b)
Flags of Maritime Nations	3,000	800	10	20	1,200	3	291	Navy Department	1,000	.....do	(b)
Decisions of the First Comptroller....	6,974	760	9	58	3,010	9	83	First Comptroller	2,000	Joint res., August 3, 1882.....	(b)
								For government officers	1,204		
Second Annual Report of the Directors of the Geological Survey.	11,000	2,500	32	4	5,000	16	152	Geological Survey	2,500	Joint res., August 5, 1882	(b)
								For sale by Public Printer...	1,000		
Third Annual Report of the Directors of the Geological Survey.	11,000	2,500	32	4	5,000	16	152	Geological Survey	2,500	....do	(b)
								For sale by Public Printer...	1,000		
Land Laws and History of Public Domain:											
Vol. 1	8,500	2,000	25	50	5,000	16	152	Interior Department.....	1,500	Joint res., August 7, 1882....	(b)
Vol. 2	8,500	2,000	25	50	5,000	16	152	.....do	1,500	.....do	(b)
Digest of Contested Election Cases of Forty-fifth and Forty-sixth Congresses.	1,900	.....	.....	.....	.....	.....	.....	Congress	1,900	Joint res., August 8, 1882	(b)
Report of Commissioner of Agriculture, 1881	300,000	56,000	717	74	214,000	706	82	Department of Agriculture...	30,000	.....do	(b)
Reports of the Tenth Census (c)	10,000	3,000	39	86	6,000	19	289	Interior Department.....	1,000	Act of August 7, 1882.....	(b)
Report on Population, Census, 1880 ..	20,000	6,000	78	72	12,000	39	261	.....do	2,000	.....do	(b)

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Report on Agriculture, Census, 1880	20,000	6,000	78	72	12,000	39	261	.....do	2,000	.....do	(b)
Report on Manufactures and Mechanics, Census, 1880.	10,000	3,000	39	36	6,000	19	289	.....do	1,000	.....do	(b)
Report on History of National Loan, Census, 1880.	6,000							Treasury Department	6,000	.....do	(b)
Report on Fish and Fisheries, Census, 1880.	1,500							Fish Commissioner	1,500	.....do	(b)
Compendium of the Tenth Census, 1880.	100,000	30,000	394	56	60,000	199	101	Interior Department	10,000	.....do	(b)
Official Record of the War of the Rebellion: d											
Vol. 6	11,000	1,976	26	.....	6,321	21	.....	Executive departments Secretary of War for Army officers. For sale by Secretary of War.	1,000 1,000 703	.....do	$9,136 34
Vol. 7	11,000	1,976	26	.....	6,321	21	.....	Executive departments Secretary of War for Army officers. For sale by Secretary of War.	1,000 1,000 703	.....do	(b)
Vol. 8	11,000	1,976	26	.....	6,321	21	.....	Executive departments Secretary of War for Army officers. For sale by Secretary of War.	1,000 1,000 703	.....do	(b)
Vol. 9	11,000	1,976	26	.....	6,321	21	.....	Executive departments Secretary of War for Army officers. For sale by Secretary of War.	1,000 1,000 703	.....do	(b)
Vol. 10	11,000	1,976	26	.....	6,321	21	.....	Executive departments Secretary of War for Army officers. For sale by Secretary of War.	1,000 1,000 703	.....do	(b)
Vol. 11	11,000	1,976	26	.....	6,321	21	.....	Executive departments Secretary of War for Army officers. For sale by Secretary of War.	1,000 1,000 703	.....do	(b)
Vol. 12	11,000	1,976	26	.....	6,321	21	.....	Executive departments Secretary of War for Army officers. For sale by Secretary of War.	1,000 1,000 703	.....do	(b)
	795,684	183,742	2,362	1,126	478,817	1,568	4,456		133,125		
To which, estimating the final reports of the Tenth Census at 16 volumes, should be added as follows	150,000	45,000	585	540	90,000	284	4,335		15,000		
Total	945,684	228,742	2,947	1,666	568,817	1,852	8,791		148,125		

a By authority of a joint resolution approved July 7, 1882, the "usual number," 1,900, of each document named in this table ordered by the two houses of Congress will be printed additional to those herein specified, excepting such as are included in the Executive or Miscellaneous documents of Congress, and those printed prior to the passage of said resolution. *b* Not yet published. *c* It is estimated that the Report of the Tenth Census will embrace from fifteen to twenty quarto volumes. On the supposition that it will contain sixteen volumes, the aggregate number in the entire series for which provision is made is 350,650 volumes. This includes the 50 copies of each volume that go to the Library of Congress, and also the "usual number" of each. *d* It is estimated that this work will embrace eighty-four volumes additional to the twelve above enumerated. Should existing provisions govern the printing of the remaining volumes, the aggregate number of volumes in the entire series will be 1,228,700. This number includes the 50 copies of each volume that go to the Library of Congress, and the "usual number" of each volume authorized by joint resolution of July 7, 1882.

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RECAPITULATION.

	Total number ordered.	Usual number.	Ordered for the Senate.	To each Senator.	Surplus.	Ordered for the House.	To each Representative.	Surplus.	Number of copies.
Documents of the Forty-fifth Congress, printed in compliance with prior laws, continuous in their operation	653, 196	186, 200	198, 252	1, 359	2, 504	274, 327	879	8, 244	84, 417
Documents ordered by special act or resolution of the Forty-fifth Congress	992, 950	.....	205, 752	2, 614	1, 864	652, 202	2, 124	8, 634	134, 996
Total	1, 646, 146	186, 200	314, 004	3, 973	4, 368	926, 529	3, 003	16, 878	219, 413
Documents of the Forty-sixth Congress, printed in compliance with prior laws, continuous in their operation	736, 887	222, 300	121, 760	1, 527	2, 912	304, 031	972	9, 777	88, 796
Documents ordered by special act or resolution of the Forty-sixth Congress	1, 587, 367	.....	336, 936	4, 271	3, 798	978, 658	3, 192	11, 427	271, 773
Total	2, 324, 254	222, 300	458, 696	5, 748	6, 610	1, 282, 689	4, 164	21, 204	360, 569
Documents of the Forty-seventh Congress, first session, printed in compliance with prior laws, continuous in their operation	409, 263	144, 400	63, 342	795	1, 504	154, 588	495	4, 779	46, 933
Documents ordered by special act or resolution of the Forty-seventh Congress, first session	945, 684	.....	228, 742	2, 947	1, 666	568, 817	1, 852	8, 791	148, 125
Total	1, 354, 947	144, 400	292, 084	3, 742	3, 170	723, 405	2, 347	13, 570	195, 058

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47TH CONGRESS, 2d Session. | SENATE. | Ex. Doc. No. 24.

LETTER

FROM

THE SECRETARY OF THE TREASURY,

TRANSMITTING,

In response to Senate resolution of July 26, 1882, a report from the Commissioner of Internal Revenue in regard to the preparation and sale of methylated alcohol duty free in Great Britain, &c.

DECEMBER 22, 1882.—Referred to the Committee on Finance and ordered to be printed.

TREASURY DEPARTMENT, *December* 20, 1882.

SIR: I have the honor to acknowledge the receipt of a resolution of the Senate, dated July 26, 1882, requesting the Secretary of the Treasury to ascertain and report to the Senate under what regulations methylated alcohol is prepared and sold duty free in Great Britain, and whether a system based upon similar regulations cannot be adopted in the United States for supplying manufacturing chemists and others with such alcohol free of tax.

A letter was addressed to the Commissioner of Internal Revenue from this office on the 2d of August last, requesting what information upon the subject therein referred to he might be able to furnish.

A copy of his report, dated December 18, in relation to the matter, together with a report from the British minister of revenue, a copy of the instructions issued for the guidance of British revenue officers upon the subject of the manufacture and disposal of methylated spirits and British plain spirits, a copy of the spirits act of 1880, and a statement showing the quantity of alcohol used in the United States in the arts, &c., during the year ending April 1, 1882, are inclosed for the information of the Senate.

The Commissioner is of opinion that regulations similar to those mentioned in the inclosures can be adopted in the United States with a few modifications, and I perceive no reason, as at present advised, to dissent from his opinion.

Very respectfully, CHAS. J. FOLGER,
Secretary.

Hon. DAVID DAVIS,
President of the United States Senate, Washington, D. C.

TREASURY DEPARTMENT,
OFFICE OF INTERNAL REVENUE,
Washington, December 18, 1882.

SIR: Your letter of the 14th instant, relative to supplying manufacturing chemists and others with methylated alcohol free of tax, has been received.

A set of printed documents referred to in the letter, obtained through the Department of State from the United States minister at London, in

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compliance with request made in my letter of 18th of September last, has also been received.

In reply, I have to say that such portion of Senate resolution of July 26, 1882, as directs the Secretary of the Treasury to ascertain under what regulations methylated alcohol is prepared and sold duty free in Great Britain would be fully answered by submitting to the Senate the printed documents above referred to, and which are herewith returned in accordance with your request.

I would also say, in reply to the second branch of the inquiry, that in my opinion similar regulations can, with a few modifications, be adopted in the United States and made a part of the laws governing the tax on distilled spirits.

The adoption of the system would involve the creation under internal-revenue laws of two new classes of special-tax payers, namely, methylated-spirit makers, to pay a tax, say, of $48 per annum, and of retail dealers in methylated spirits, to pay a tax of $2.40 per annum.

It would also be necessary to create officers whose duty would be to witness the mixing of the spirits with the required proportion of wood naphtha, to exercise certain surveillance, to keep certain accounts, and make certain reports set forth in the regulations, or to devolve those duties on existing officers.

It is noted that samples of all naphtha to be used are to be taken by the proper officer and forwarded to the laboratory for examination and approval of the Board of Commissioners of Internal Revenue. A literal adaptation of this regulation would appear to require such samples to be sent to this office. Owing to the great extent of territory comprised in the United States, this regulation would seem to be impracticable. It would seem to be better to have arrangements made for testing naphtha at certain designated points.

Certain methods by which frauds could be committed were referred to in my letter of September 18, 1882, and I would respectfully suggest whether it would not be well to transmit to the committee a copy of said letter.

An examination of the British regulations indicates that they are best adapted to thickly settled countries. It would be necessary, therefore, to frame the law so as to admit of modifications in the regulations adapted to the sparsely settled portions of the United States, or to limit their manufacture and use of methylated alcohol to areas having not less than a certain density of population.

The foregoing crude suggestions are made upon a mere reading of the law and regulations returned herewith.

I cannot venture any more definite suggestions without attempting to draft regulations which would provide for the manufacture, sale, and use of methylated spirit free of tax under internal-revenue laws. In this way the necessary legislation could be determined. This, however, would require time, and as the report received from the State Department did not arrive until ten days after the opening of Congress, the date set for the introduction of the bill, I have not deemed it advisable, without special authority, to create further delay in this matter.

No report has yet been received from the Academy of Sciences showing the result of experiments being made by that scientific body, referred to on page 18 of my Report for 1882, to determine whether alcohol mixed with wood naphtha can be restored to its original purity.

Very respectfully,

H. C. ROGERS,
Acting Commissioner.

Hon. CHARLES J. FOLGER,
Secretary of the Treasury.

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Statement by districts and in proof gallons of the quantity of alcohol used in the arts and manufactures during the year ended April 1, 1882; also, the quantity estimated which would have been used in case the tax were 50 cents per gallon, and in case there were no tax

District and State.	Quantity used and estimated.			By whom used.
	Actually used.	Estimates.		
		At 50 cts. tax.	At no tax.	
First Alabama	4,900	7,994	13,235	Chemists, druggists, photographers.
Second Alabama	10,000	15,000	20,000	Not stated.
Arizona	1,308	1,308	1,308	Apothecaries, photographers, painters.
Arkansas	200	200	200	Not stated.
Fourth California	5,090	5,000	5,000	Central Pacific Railroad Company and others.
First Connecticut	16,800	21,000	33,600	Not stated.
Second Connecticut	75,369	111,953	198,026	Do.
Colorado	7,832	9,148	13,045	Druggists and manufacturing chemists.
Dakota	4,000	4,000	4,000	Not stated.
Delaware	6,260	7,512	8,138	Do.
Florida	.....	.....	.....	None, except small quantity by druggists.
Second Georgia	9,362	14,418	22,425	Druggists.
Third Georgia	43,350	43,350	54,187	Druggists, photographers, tobacco manufacturers.
Idaho	400	400	400	Druggists.
First Illinois	41,917	43,777	46,730	Chemists, druggists; varnish, tobacco, white lead, and hat manufacturers and photographers.
Second Illinois	16,500	16,500	16,500	Not stated.
Fourth Illinois	21,757	22,241	23,341	Do.
Fifth Illinois	5,000	5,500	5,500	Do.
Seventh Illinois	20,000	20,000	20,000	Do.
Eighth Illinois	13,812	15,867	18,032	Do.
Thirteenth Illinois	6,000	6,000	6,000	Do.
First Indiana	15,511	21,472	40,338	Seventy per cent. by druggists in making tinctures; balance by manufacturers of furniture, machinery, photographs, and hats.
Fourth Indiana	4,000	4,000	4,000	Not stated.
Sixth Indiana	50,000	62,500	75,000	Do.
Seventh Indiana	16,948	20,116	22,538	Do.
Tenth Indiana	39,067	44,269	48,160	Railroads, machinists, brass founders, carriage manufacturers, druggists, photographers, perfumers, chemists, plumbers.
Eleventh Indiana	12,500	12,500	12,500	Not stated.
Second Iowa	10,000	10,000	10,000	Druggists, photographers, and manufacturers of paints, oils, and flavoring extracts, &c.
Third Iowa	119,304	149,594	191,978	Four wholesale and 291 retail druggists, and 180 photographers.
Fourth Iowa	30,000	30,000	30,000	Not stated.
Fifth Iowa	6,170	6,170	6,170	Ninety druggists.
Kansas	12,000	12,000	12,000	Druggists.
Second Kentucky	.....	.....	.....	None.
Fifth Kentucky	25,000	30,000	75,000	Fifty leading business men.
Sixth Kentucky	2,000	2,000	2,000	Mostly by druggists in quantity, and by tobacco manufacturers trifling.
Seventh Kentucky	3,320	3,320	3,320	Eighty-three places, principally druggists.
Eighth Kentucky	.....	.....	.....	None.
Ninth Kentucky	2,000	2,000	2,000	Druggists and others.
Louisiana	58,500	62,450	308,450	Druggists, perfumers, photographers, and tobacco manufacturers.
Maine	130,000	130,300	131,800	Druggists and one varnish manufacturer.
Third Maryland	169,890	226,520	339,780	Druggists and others.
Fourth Maryland	3,328	4,363	5,956	Do.
Third Massachusetts	732,600	769,230	805,860	Not stated.
Fifth Massachusetts	250,000	275,000	400,000	Tobacco manufacturers, chemists, druggists, photographers, &c.
Tenth Massachusetts	104,350	104,550	106,350	Not stated.
First Michigan	113,245	150,993	198,178	Manufacturing chemists, principally.
Third Michigan	7,000	7,000	7,000	Not stated.
Fourth Michigan	10,000	10,000	10,000	Do.
Sixth Michigan	35,000	38,500	46,667	No large manufacturers using alcohol.
First Minnesota	11,280	11,280	11,280	Retail druggists and photographers.
Second Minnesota	13,190	17,000	25,000	Not stated.
First Missouri	217,100	352,600	622,100	Chemists, druggists, photographers; tobacco, vinegar, paints, hats, flavoring extracts.
Second Missouri	4,000	4,000	4,000	Not stated.
Fourth Missouri	2,072	2,400	2,850	Do.
Fifth Missouri	10,892	11,852	12,562	Druggists, photographers, tobacco manufacturers.
Sixth Missouri	14,800	14,920	18,870	Not stated.
Montana	1,500	1,500	1,500	Druggists and photographers.
Nebraska	1,560	1,500	1,500	Not stated.

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Statement by districts and in proof gallons of the quantity of alcohol used, &c.—Continued

District and State.	Quantity used and estimated.			By whom used.
	Actually used.	Estimates. At 50 cts. tax.	Estimates. At no tax.	
New Hampshire	67,500	67,500	67,500	About 6,500 gallons by painters, photographers, and manufacturers; balance by druggists.
Nevada	1,500	1,500	1,500	Not stated.
First New Jersey	1,000	1,000	1,000	Do.
Third New Jersey	4,500	4,500	4,500	Druggists, photographers, &c.
Fifth New Jersey	83,667	312,443	396,977	Not stated.
New Mexico	1,600	1,700	2,000	Do.
First New York	137,240	149,840	184,000	Chemists, druggists, hatters, photographers, tobacco and picture-frame varnish manufacturers.
Second New York	365,000	356,000	494,000	Not stated.
Third New York	55,422	55,422	83,133	Druggists and varnish manufacturers.
Eleventh New York	35,229	44,036	52,843	Not stated.
Twelfth New York	28,000	36,000	50,000	Do.
Fourteenth New York	135,000	200,000	275,000	Do.
Fifteenth New York	6,000	6,000	6,000	Druggists; no large manufacturers.
Twenty-first New York	4,500	5,000	5,000	Not stated.
Twenty-fourth New York	6,064	7,544	14,044	Do.
Twenty-sixth New York	1,800	1,800	1,800	Do.
Twenty-eighth New York	70,000	85,000	100,000	Patent medicine and perfumery manufacturers, and small lots by hatters, tobacco manufacturers, photographers, &c.
Thirtieth New York	37,104	45,598	125,000	Manufacture of medicines, vinegar, &c.
Second North Carolina	2,310	2,425	2,772	Not stated.
Fourth North Carolina	3,790	4,737	7,580	Do.
Fifth North Carolina	350	350	700	Do.
First Ohio	73,297	118,241	247,978	Tobacco, hat, and varnish manufacturers, photographers, manufacturing chemists, druggists, furniture, picture-frames, &c.
Third Ohio	10,405	13,960	20,720	Not stated.
Fourth Ohio	11,281	11,847	15,290	Druggists and manufacturers.
Sixth Ohio	2,818	2,818	2,828	Druggists and one paint factory.
Seventh Ohio	8,840	8,840	8,840	Not stated.
Tenth Ohio	6,000	8,000	10,000	Do.
Fifteenth Ohio	5,000	5,000	10,000	Do.
Eighteenth Ohio	65,135	195,609	280,544	Do.
First Pennsylvania	150,000	195,000	195,000	Manufacturing chemists, white lead and hat manufacturers; druggists and chemists, 30,000.
Eighth Pennsylvania	35,000	35,000	52,500	Photographers, machinists, plumbers.
Ninth Pennsylvania	8,000	8,000	10,000	Druggists, photographers, varnish manufacturers.
Twelfth Pennsylvania	19,454	26,003	35,897	Not stated.
Fourteenth Pennsylvania	7,083	8,000	10,000	Do.
Sixteenth Pennsylvania	7,774	8,551	8,551	Do.
Nineteenth Pennsylvania	15,500	15,500	15,000	Druggists, perfumers, &c.
Twentieth Pennsylvania	23,200	23,200	23,200	Druggists, artists, &c.
Twenty-second Pennsylv'a	260	260	260	One tobacco manufacturer.
Rhode Island	150,000	150,000	150,000	Not stated.
South Carolina	450	450	450	Do.
Second Tennessee	15,000	15,000	15,000	Do.
Fifth Tennessee	19,625	30,000	100,000	Do.
Eighth Tennessee	13,000	17,000	20,000	Do.
First Texas	5,000	5,000	5,000	Do.
Third Texas	200	200	200	Hatters and photographers.
Fourth Texas	8,351	8,351	8,351	One hundred and sixty-five druggists and photographers.
Utah	8,000	8,000	8,000	Photographers and druggists.
Vermont	19,306	19,306	19,306	Not stated.
Second Virginia	7,622	10,000	14,000	Do.
Third Virginia	14,120	14,120	17,650	Druggists and photographers; besides, tobacco and cigar manufacturers used 13,400 rum and rectified spirits.
Fourth Virginia	600	600	700	Not stated.
Fifth Virginia	2,800	4,200	5,000	Do.
Sixth Virginia	3,117	4,026	4,601	Do.
First West Virginia	11,000	11,000	11,000	Druggists, 10,000; others, 1,000.
Second West Virginia	3,500	3,500	4,375	Not stated.
First Wisconsin	2,000	2,000	2,000	Wholesale druggists and others.
Second Wisconsin	20,580	20,580	21,080	Druggists and perfumers.
Third Wisconsin	9,250	12,100	15,300	Not stated.
Sixth Wisconsin	10,000	10,000	10,000	Manufacturing chemists, druggists, tobacco manufacturers, &c.
Wyoming	2,000	2,500	2,750	Druggists and photographers.
Total	4,269,978	5,397,224	7,367,594	

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